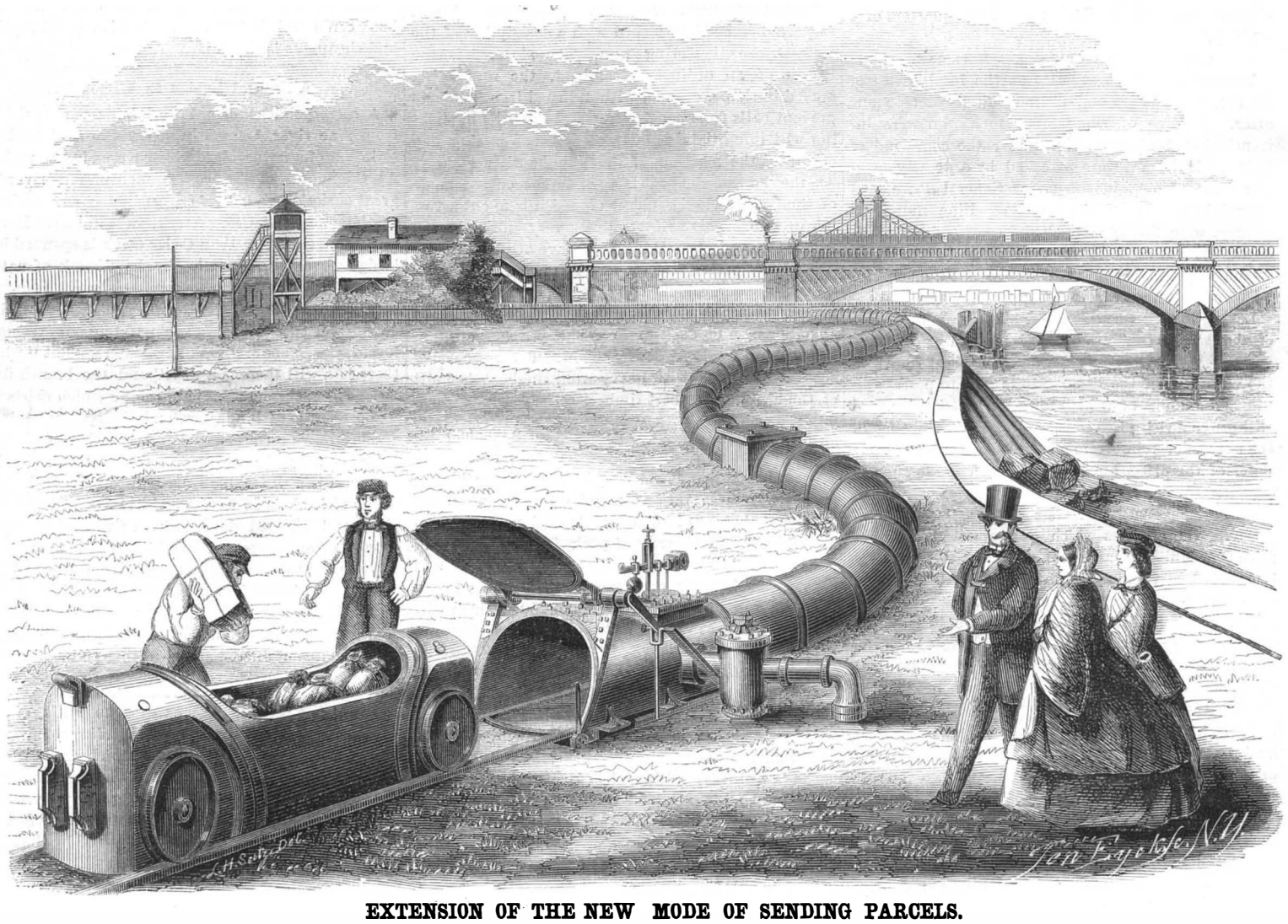
Scientific American.

A JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, AGRICULTURE, CHEMISTRY, AND MANUFACTURES.

VOL. V.—NO. 14. NEW YORK, OCTOBER 5, 1861. NEW SERIES

Pneumatic Dispatch.

A company has been formed in London under the title of the Pneumatic Dispatch Company, for establishing lines of pneumatic tube for the speedy conveyance of letters and parcels. The chief feature of the invention consists in propelling a train of carriages through a tube by the creation of a vacuum before them; the tube being, in fact, the cylinder, and the carriages the piston. A piece of ground adjoining the Victoria Railway bridge at Battersea, and belonging to the Vauxhall Waterworks Company and London and Brighton Company, has been selected for testing the project. Here upward of a quarter of a mile of the tubing has been laid down; various irregular curves and gradients being introduced to show that hills and valleys would not prevent the effective working of the system. The apparatus certainly works well. With an exhaustion varying from seven inches to eleven inches of water, or from four ounces to six ounces per square inch, the speed is about twenty-five miles an hour. The tube through which the dispatch trucks are drawn is not circular in form, but of a section resembling that of an ordinary railway tunnel; the internal hight being two feet nine inches, the width at the springing of the arch (the top being semi-circular) two feet six inches and at the springing of the invert (for the tube has a segmental bottom) two feet four inches. The tube is of cast iron, in nine feet lengths, each weighing about one tun, and fitted into each other with an ordinary socket joint, packed with lead. Within the tube, and at the lower angles on either side, are cast raised ledges, two inches wide on the top, and one inch high, answering the purpose of rails for the wheels of the despatch trucks to run upon. The latter are made of a framing seven or eight feet long, inclosed in sheet iron, and having four flanged wheels, twenty inches in diameter each. The whole truck is so made that its external form, in cross section, conforms to that of the tube, although it does not fit it closely, an intervening space of an inch or so being left all around. Some light india rubber flanges or rings are applied at each end of the truck, but even these do not actually fit the inner surface of the tube, a slight "windage" being left around the whole truck. There is, therefore, no friction beyond that of the wheels; and the leakage of air, under a pressure of four or five ounces per square inch, amounts to but little. The air is exhausted, from near one end of the tube, by means of an exhausting apparatus, from which the air is discharged by centrifugal force. Some idea of this apparatus, which is very simple may be formed by comparing it to an ordinary exhausting fan. It is the intention of the company, now that they have obtained Parliamentary powers for opening the streets to lay down their tubes, to establish a line between St. Martin's-le-Grand and one of the district post offices, and ultimately to extend their system throughout the metropolis, so as to connect the railway stations and public offices.



EXTENSION OF THE NEW MODE OF SENDING PARCELS.

Some successful experiments were made on Tuesday. One trip was made in sixty seconds, and a second in fifty-five seconds, the distance being a quarter of a mile. Two gentlemen occupied the carriages during the first trip. They lay on their backs on mattresses, with horsecloths for coverings, and appeared to be perfectly satisfied with their journey. It is calculated that the carriages will eventually move through the tubes at the rate of from thirty to forty miles an hour. The arrangements are in the hands of Mr. Latimer Clarke and Mr. Rimmell.

[The above description is taken from the London *Illustrated News*, and our engraving is compiled from a series of cuts in the same paper; our artist having succeeded admirably in showing in this one large view the whole structure and operation of the apparatus, which is less clearly displayed in the pages of our famous cotemporary.—Ed.

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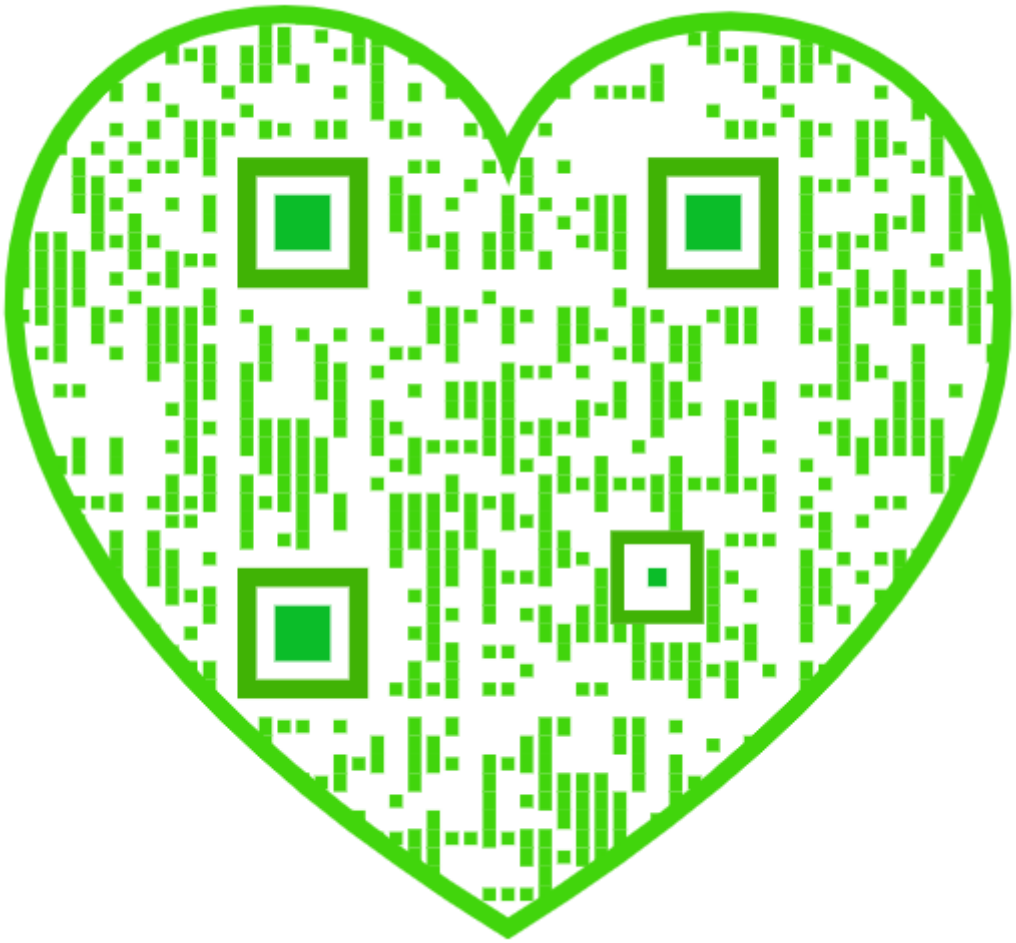

THE WAR.

FREMONT'S PROCLAMATION AND THE PRESIDENT.

We have already published in full General Fremont's proclamation declaring the slaves of the Missouri secessionists free men, and the President's order modifying this proclamation into conformity with the law of Congress. The following extract of a letter from the Hon. Joseph Holt, of Kentucky, shows how the action of General Fremont and the President is viewed by the leading loyal men of that great commonwealth :—

"The government has the same right to confiscate slaves engaged in digging trenches for mounting guns for the rebels that it has to confiscate their arms when captured during the progress of the war, but, having confiscated them, Congress goes no further. Upon this law the President stands firmly, and in doing so, and disavowing General Fremont's proclamation, he gives another of the ever-multiplying proofs that the war, which is one for national existence, does not seek to extinguish or interfere with slavery as established in the States. If this institution suffers detriment from the events or issues of the rebellion, the blow will come from those who, under the pretense of defending it, are striking at the life of a government under whose constitution it has enjoyed complete shelter and protection for three-quarters of a century."

THE SURRENDER OF COLONEL MULLIGAN.

The country is sick at heart at the intelligence of another unnecessary and disgraceful disaster to our arms. A force of some 3,500 men who were intrenched at Lexington, Mo., under the command of Colonel Mulligan, were attacked by a greatly superior force of secessionists under General Price, and after fighting several days and repelling numerous attacks, were finally compelled to surrender on Friday afternoon, Sept. 20th. Colonel Mulligan had unfortunately a large number of horses in his camp, which all fell a prey to the enemy.

Lexington is a very beautiful and flourishing town of about 7,000 inhabitants, on the south bank of the Missouri river, forty-five miles in a straight line from the west edge of the State. It is said to possess an unusual amount of wealth for a town of its size, and will prove a rich prize to its captors. At the time of the surrender reinforcements were hastening to the relief of the place, but they did not arrive in time to save it.

FIGHT AT BLUE MILLS.

One of those bodies which were marching to reinforce Col. Mulligan, a portion of the Third Iowa Regiment, 570 men under Lieut.-Colonel Scott, marching from the north, overtook a body of secessionists, stated at 4,500 in number, at a place called Blue Mills, on the Missouri river, above Lexington, on the afternoon of the 17th, and immediately attacked them. The fight lasted till dusk, and the next morning Lieut.-Col. Scott, having been joined by 1400 men under Col. Smith, advanced to renew the attack, when he found that the enemy had crossed the river, and marched to join Gen. Price before Lexington.

BEGINNING OF THE WAR IN KENTUCKY.

The armed organizations of the two parties in Kentucky are known by the same names as in Missouri—the secessionist troops being called the State Guard and the Union forces the Home Guard. Though the Unionists have a majority of about three to one in the State, the secessionists, with their usual audacity, are preparing for fight, and it seems certain that that noble Commonwealth is to be desolated by civil war. The first fighting took place on the evening of Sunday, Sept. 22. A large body of secessionist troops is stationed at Columbus, a small town on the Mississippi, twenty miles below the mouth of the Ohio. The pickets of the Iowa Seventh, at Elliott's Mills, Ky., eight miles above Columbus, were approached on Sunday evening by a body of rebel infantry numbering 50 or 60. The Iowa boys fired upon them, bringing down three or four. The enemy returned the fire without doing any damage.

THE Taunton (Mass.) Locomotive Manufacturing Company is engaged in rifling breech-loading carabines for cavalry use. An order to rifle one thousand has been nearly completed.

SIX hundred thousand pairs of sewed shoes are now being manufactured in Massachusetts for the army.

"Sermons in Stones."

The following are the mottoes on two highly finished blocks of marble ordered by the Legislatures of their respective States, and now in Washington awaiting their places in the Washington Monument :

LOUISIANA.
Ever Faithful to the Constitution and the Union.

TENNESSEE.
The Federal Union—It Must be Preserved.

Could our Federal army desire any stronger motives to duty than those suggested by men who thus, untrammelled, expressed their sentiments before the arm of tyranny sealed their lips?

Enfield Arms.

The government armory for manufacturing rifles at Enfield Lock, England, covers an area of 30 acres, giving employment to about 1,700 persons. Many suppose that all the rifles for the army in England are made at Enfield. This is not the case ; more rifles are made for the government by private makers in Birmingham than at Enfield, but all the patterns are furnished by the proper army officers. Great quantities of rifles are manufactured to foreign orders in Liege, Belgium, which city has long been famous for fabricating military arms.

THE NEW ORLEANS BATTERING RAM.—The Cincinnati *Enquirer* has been furnished with a description of the New Orleans battering ram. The steamer is the length of an ordinary steamboat, the roof being arched in shape, covered with railroad iron, so as to prevent balls from penetrating, and the balls in striking will immediately glance off without having any effect, let the position of the gun be what it may. At the bow of the boat is a ponderous cutter, made of the best steel, the object of which is to cut a vessel in two. This will require a very great power, which the projectors think they have attained in the way of two powerful engines. The mode of attack is with hot water, which is thrown through hose attached to the boilers. The vessel attacked cannot keep her men on deck, nor can she use her cannon, as they will be kept wet by the water thrown. Beside being covered with heavy iron, the boat is built of the heaviest and best timber.

FOOD FOR THE ARMY.—Upwards of 3,000,000 rations for the army of the Potomac, are now stored in the receiving depots at Washington. Some idea of the bulk of these rations may be formed when we state that there are 18,000 barrels of flour, 9,000 barrels of beef, 3,000 barrels of pork, 500,000 pounds of coffee, 500,000 pounds of sugar, 500,000 pounds of bread, with hominy, crackers, vinegar, candles, soap and salt in proportion. An army of 250,000 men will consume all these rations in twelve days.

WARRIORS OF THE WEST.—The states of the west are fully aroused to the great work before them. Ohio has now thirty-three regiments in the service and promises that, if Kentucky wants them, to send 20,000 men within a fortnight, all armed and equipped as the law directs. Illinois has furnished forty-seven regiments, and is preparing thirteen more, making in all sixty thousand men. Indiana will soon have forty thousand soldiers in the field, and whenever these legions fight somebody will be injured.

CANNON AT BALTIMORE.—The Baltimore *American* says that sixty-four cannon have reached that point from Pittsburgh, for the fortifications on Federal Hill, and that there are six similar pieces awaiting removal from the Bolton depot to the same destination.

SECESSION CROP.—The New Orleans *Picayune* says the heavy growth of grass in some of the streets of that city "would pay the mower for his trouble." New Orleans has hitherto been one of the most prosperous cities in the country, but is now suffering terribly from the effects of secession.

THE State prisoners recently arrested in Baltimore, consisting of the Mayor, twelve members of the Maryland Legislature, and two editors of newspapers, have been taken from Fort McHenry to Fortress Monroe.

We understand that the Navy Department has accepted propositions from Messrs. C. S. Bushnell & Co., of New Haven, Merrick & Sons, of Philadelphia and J. Erricsson, of New York, for the construction of iron-clad vessels.

The Card Machine.

Wire cards are an American invention. The ingenious Oliver Evans, of Philadelphia, is said to be the original inventor of machinery for cutting and bending card teeth and piercing the leathers. In 1788 a wire card manufactory was established in Boston by Richards & Co. Their machinery was greatly improved by Amos Whittemore, an ingenious blacksmith, who became a partner in the company. In 1800, they had three card factories in operation in Boston, and made 12,000 dozen of wire cards yearly. They used American-made leather and wire entirely, and were enabled to export their cards to England, where in a few years such cards superseded all others. Amos Whittemore brought the card machine almost to the same state of perfection in which we find it at the present day, and no one can examine it without coming to the conclusion that it is one of the most ingenious and useful pieces of mechanism that has been invented. This machine created a complete revolution in the card business in England and America by reducing all the successive operations of holding and piercing the leather, drawing the wire from the reel, cutting and bending the card tooth, inserting and finally shaping the tooth, to a series of rapid, precise and completely automatic movements. Sheet cards for cotton and wool, hatters' cards and clothiers' cards and jacks were made with great rapidity and cheapness by its aid.

A Natural Bridge in Wisconsin.

A correspondent of a Philadelphia paper, writing from Pine river, Wisconsin, gives the subjoined description of a natural bridge discovered in the region : At the mouth of the west branch of Pine river is a great curiosity—a *natural bridge*, almost as wonderful as the one over Cedar creek, in Virginia. Here a stream much larger than Cedar creek is spanned by a bridge of rock and earth, the handiwork of nature herself. The west branch of Pine river flows through a most beautiful and fertile valley, eastward, until it nears the main stream, when a high bluff seems to forbid the blending of their waters. But "where there is a will there is a way," and the branch finds an opening through the high bluff which skirts the western shore of Pine river, and their waters mingle and murmur on toward the great "father of rivers." Here is a natural tunnel, from fifteen to twenty feet wide and twelve feet high, right through a rocky hill, whose altitude is 80 feet. The hill is covered with tall pines and foliaged down to both rivers with a dense growth of evergreen. The bridge is wide enough for three teams to drive abreast, and, from its location, I have no doubt but a thoroughfare will, at some future time, be established along this romantic way. Sufficient water passes under the bridge, even in the sultry month of July, to set a-rolling and a-rumbling a dozen of the largest mills in the State.

GREAT ADVANCE IN COTTON.—"The mills of this city," says the Manchester (N. H.) *Mirror*, "have a large quantity of cotton on hand which has advanced in price since it was bought about one million of dollars. That owned by the Amoskeag Company would sell for $480,000 more than it cost ; that owned by the Stark Mills, $250,000, and that owned by the Manchester Mills $165,000. Sum total $9 95,000. It would be a handsome profit enough if they would sell it, but they will not sell a single pound, though the advance of goods does not correspond at all with the advance on cotton. They will keep it and manufacture it at a loss compared with the sale of the raw material, for the benefit of the operatives and the people of the city depending upon the running of our mills for a support."

SUPERHEATING STEAM FOR ENGINES.—In the superheating of steam for engines, care must be exercised to prevent it being raised above 400° Fah. We are informed by engineers who have used it that when the temperature of superheated steam reaches above this figure it becomes fatal to economy by the drying action which it exerts upon the lubricating material used for valves and pistons.

THE first American horn combs were made in West Newbury, Mass., which place still leads all the places on this continent for making combs. The materi[illegible] now used, however, is not horn, but hard indi[illegible] ber.

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THE POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The usual weekly meeting of the Association was held at its room at the Cooper Institute, on Thursday evening, Sept. 19, 1861. We publish an account of such portion of the proceedings as we think will be interesting to our readers.

EFFECT OF THE WAR ON THE MECHANIC ARTS.

President MASON read his paper on this subject. The first effect of the breaking out of the war was to draw off a large portion of mechanics. In the county opposite his residence on the North River, which has large manufacturing interests, it was easy to raise a regiment, while in Duchess county, a purely farming district, it was difficult to recruit a single company. Whatever else may be the result of the war, the South will learn *not to despise the mechanic arts*. Even if separation should result, this would not prove disastrous to the North.

Mr. GARBONNETTI—If the war should continue two or three years, cotton will be supplied from other places, and will cease to be produced in this country. If the cotton culture is abandoned, the cause of the war, slavery, will be permanently removed.

Dr. STEVENS—If the war should be short, as we all hope and pray that it may, it will produce only a temporary effect on our mechanical operations, but if it should last five or seven years, it will destroy our largest manufacturing interest. The machinery in the cotton manufacture must be adapted to the kind of staple worked. I have been told by manufacturers that a difference of a quarter of an inch, even, requires a change of machinery. Now there is no country except the United States that can raise the various kinds of cotton to which our machinery is adapted. To produce cotton successfully, several conditions of climate are required. Frequent showers combined with abundant heat must prevail in the early part of the season, while the plant is growing, and then a long period of dry weather is necessary for the gathering of the crop. Were the heat and moisture alone sufficient, the tropics would be the best places for cultivating cotton. The plant grows with great vigor in South America, but three quarters of the fiber always rots before it can be collected. Our glorious autumn days are to be found nowhere else on the face of this earth. The trade winds, which come across the Atlantic, become loaded with moisture, and as they are deflected northward over the land, they pour down their showers upon it. In the fall these winds are diverted to the south, and the showers cease, giving that long dry season which is devoted to picking cotton. A belt of country along our coast, stretching from Texas to the southern boundary of North Carolina, and extending inland from 100 to 300 miles, has peculiar advantages for producing the cotton fiber, which do not exist in any other place on the surface of our planet.

President MASON—I will remark, that in the early part of the year I devoted a good deal of time to investigating the efforts that have been made for procuring a supply of cotton for England. A very full history of these efforts is contained in the Reports of Parliamentary Debates, of which a set is to be found in the Astor Library. I read the reports relating to this subject from beginning to end. The great effort to introduce the culture of cotton in India commenced in 1841. The plan was then adopted of sending experienced cultivators from this country to India, with seed, utensils and all conveniencies for prosecuting the labor. The enterprise was persevered in, notwithstanding its discouraging failures, for fourteen years; finally, after all these efforts, and the expenditure of vast sums of money, the scheme was abandoned as hopeless. The last entry in the records is in these words :—"*It is resolved that the cotton on hand shall be sent to China and sold for what it will bring, and the experiment shall be considered as closed.*"

SUBJECT FOR THE NEXT MEETING.

Mr. DIBBEN—I offer as the subject for the next evening, "Piers and Docks."

This was adopted, with the usual understanding that the proposer will open the discussion with an elaborate paper on the subject.

THE large carpet manufactory of E. S. Higgins & Co., Forty-third street, this city, which had been closed since the month of April last, commenced running again on the 16th ult.

Extracts from Fairbairn's Address.

At a meeting of the British Association for the Advancement of Science at Manchester, on the 3d of September, the President, Mr. William Fairbairn, made an address on the general state of science and art, from which we take the following extracts :—

SCIENCE BENEFICIAL.

At no former period did science contribute so much to the use of life and the wants of society. And in doing this it has only been fulfilling that mission which Bacon, the great father of modern science, appointed for it, when he wrote that "the legitimate goal of the science is the endowment of human life with new inventions and riches," and when he sought for a natural philosophy which, not spending its energy on barren disquisitions, "should be operative for the benefit and endowment of mankind."

CONSTITUTION OF THE SUN.

Our knowledge of the physical constitution of the central body of our system seems likely, at the present time, to be much increased. The spots on the sun's disk were noticed by Galileo and his cotemporaries, and enabled them to ascertain the time of its rotation and the inclination of its axis. They also correctly inferred, from their appearance, the existence of a luminous envelope, in which funnel-shaped depressions revealed a solid and dark nucleus. Just a century ago, Alexander Wilson indicated the presence of a second and less luminous envelope beneath the outer stratum, and his discovery was confirmed by Sir William Herschel, who was led to assume the presence of a double stratum of clouds, the upper intensely luminous, the lower gray, and forming the penumbra of the spots. Observations during eclipses have rendered probable the supposition that a third and outermost stratum of imperfect transparency encloses concentrically the other envelopes. Still more recently, the remarkable discoveries of Kirchoff and Bunsen require us to believe that a solid or liquid photosphere is seen through an atmosphere containing iron, sodium, lithium, and other metals in a vaporous condition.

We must still wait for the application of more perfect instruments, and especially for the careful registering of the appearances of the sun by the photoheliograph of Sir John Herschel, so ably employed by Mr. Warren de la Rue, Mr. Welsh and others, before we can expect a solution of all the problems thus suggested.

DYES IN COAL TAR.

What would now be the condition of calico-printing, bleaching, dyeing, and even agriculture itself, if they had been deprived of the aid of theoretic chemistry?

For example :—Aniline—first discovered in coal tar by Dr. Hoffman, who has so admirably developed its properties—is now most extensively used as the basis of red, blue, violet and green dyes. This important discovery will probably, in a few years, render this country independent of the world for dye stuffs; and it is more than probable that England, instead of drawing her dye stuffs from foreign countries, may herself become the center from which all the world will be supplied.

It is an interesting fact that at the same time in another branch of this science, M. Tournet has lately demonstrated that the colors of gems, such as the emerald, aqua-marina, amethyst, smoked rock crystal and others, are due to volatile hydro-carbons, first noticed by Sir David Brewster in clouded topaz, and that they are not derived from metallic oxyds as has been hitherto believed.

THE COMPOSITION OF STEEL.

In noticing the more recent discoveries in this important science, I must not pass over in silence the valuable light which chemistry has thrown upon the composition of iron and steel. Although Despretz demonstrated many years ago that iron would combine with nitrogen, yet it was not until 1857 that Mr. C. Binks proved that nitrogen is an essential element of steel, and more recently M. Caron and M. Fremy have further elucidated this subject; the former showing that cyanogen, or cyanide of ammonium, is the essential element which converts wrought iron into steel; the latter combining iron with nitrogen through the medium of ammonia, and then converting it into steel by bringing it at the proper temperature into contact with common coal gas. There is little doubt that in a few years these discoveries will enable Sheffield manufacturers to replace their present uncertain, cumbrous, and expensive process, by a method at once simple and inexpensive, and so completely under control as to admit of any required degree of conversion being obtained with absolute certainty. Mr. Crace Calvert has also proved that cast iron contains nitrogen, and has shown that it is a definite compound of carbon and iron mixed with various proportions of metallic iron, according to its nature.

INTERNAL HEAT OF THE EARTH.

It is well known that the temperature increases, as we descend through the earth's crust, from a certain point near the surface, at which the temperature is constant. In various mines, borings, and Artesian wells, the temperature has been found to increase about 1° Fah. for every sixty or sixty-five feet of descent. In some carefully-conducted experiments during the sinking of Dukinfield Deep Mine—one of the deepest pits in this country—it was found that a mean increase of about 1° in seventy-one feet occurred. If we take the ratio thus indicated, and assume it to extend to much greater depths, we should reach at two and a half miles from the surface strata at the temperature of boiling water; and at depths of about fifty or sixty miles the temperature would be sufficient to melt, under the ordinary pressure of the atmosphere, the hardest rocks. Reasoning from these facts, it would appear that the mass of the globe, at no great depth, must be in a fluid state. But this deduction requires to be modified by other considerations, viz., the influence of pressure on the fusing point, and the relative conductivity of the rocks which form the earth's crust. To solve these questions a series of important experiments were instituted by Mr. Hopkins, in the prosecution of which Dr. Joule and myself took part; and after a long and laborious investigation, it was found that the temperature of fluidity increased about 1° Fah., for every 500 lbs. pressure, in the case of spermaceti, beeswax and other similar substances. However, on extending these experiments to less compressible substances, such as tin and barytes, a similar increase was not observed. But this series of experiments has been unavoidably interrupted; nor is the series on the conductivity of rocks entirely finished. Until they have been completed by Mr. Hopkins, we can only make a partial use of them in forming an opinion of the thickness of the earth's solid crust. Judging, however, alone from the greater conductivity of the igneous rocks, we may calculate that the thickness cannot possibly be less than nearly three times as great as that calculated in the usual suppositions of the conductive power of the terrestrial mass at enormous depths, being no greater than that of the superficial sedimentary beds. Other modes of investigation which Mr. Hopkins has brought to bear on this question appear to lead to the conclusion that the thickness of the earth's crust is much greater than that above stated. This would require us to assume that a part of the heat in the crust is due to superficial and external rather than central causes. This does not bear directly against the doctrine of central heat, but shows that only a part of the increase of temperature observed in mines and deep wells is due to the outward flow of that heat.

STEAM PLOWING.

I cannot conclude this notice of the steam engine without observing the changes it is destined to effect in the cultivation of the soil. It is but a short time since it was thought inapplicable to agricultural purposes from its great weight and expense. But more recent experience has proved this to be a mistake, and already in most districts we find that it has been pressed into the service of the farm. The small locomotive, mounted on a frame with four wheels, travels from village to village with its attendant, the thrashing machine, performing the operations of thrashing, winnowing and cleaning at less than one-half the cost by the old and tedious process of hand labor. Its application to plowing and tilling on a large scale is, in my opinion, still in its infancy; and I doubt not that many members of this association will live to see the steam plow in operation over the whole length and breadth of the land. Much has to be done before this important change can be successfully accomplished; but, with the aid of the agriculturist preparing the land so as to meet the requirements of steam machinery, we may reasonably look forward to a new era in the cultivation of the soil.

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THE BESSEMER STEEL.

Previously to the invention of Henry Cort the manufacture of wrought iron was of the most crude and primitive description. A hearth and a pair of bellows were all that were employed. But since the introduction of puddling the iron masters have increased the production to an extraordinary extent, down to the present time, when processes for the direct conversion of wrought iron on a large scale are being attempted. A consecutive series of chemical researches into the different processes, from the calcining of the ore to the production of the bar carried on by Dr. Percy and others, has led to a revolution in the manufacture of iron; and although it is at the present moment in a state of transition, it nevertheless requires no very great discernment to perceive that steel and iron of any required tenacity will be made in the same furnace with a facility and certainty never before attained. This has been effected, to some extent, by improvements in puddling; but the process of Mr. Bessemer—first made known at the meetings of this association at Cheltenham—affords the highest promise of certainty and perfection in the operation of converting the melted pig direct into steel or iron, and is likely to lead to the most important developments in this manufacture. These improvements in the production of the material must, in their turn, stimulate its application on a larger scale and lead to new constructions.

IRON SHIPBUILDING.

In iron shipbuilding an immense field is opening before us. Our wooden walls have, to all appearance, seen their last days; and as one of the early pioneers in iron construction as applied to shipbuilding, I am highly gratified to witness a change of opinion that augurs well for the security of the liberties of the country. From the commencement of iron shipbuilding in 1830 to the present time, there could be only one opinion among those best acquainted with the subject, namely, that iron must eventually supersede timber in every form of naval construction. The large ocean steamers *Himalaya*, the *Persia* and the *Great Eastern* abundantly show what can be done with iron, and we have only to look at the new system of casing ships with armor plates to be convinced that we can no longer build wooden vessels of war with safety to our naval superiority and the best interests of the country. I give no opinion as to the details of the reconstruction of the navy—that is reserved for another place—but I may state that I am fully persuaded that the whole of our ships of war must be rebuilt of iron, and defended with iron armor calculated to resist projectiles of the heaviest description at high velocities.

WROUGHT IRON GUNS.

The rifling of heavy ordnance, the introduction of wrought iron, and the new principle of construction with strained hoops, have given to all countries the means of increasing enormously the destructive power of their ordnance. One of the results of this introduction of wrought iron, and correct principles of manufacture, is the reduction of the weight of the new guns to about two-thirds the weight of the older cast-iron ordnance. Hence follows the facility with which guns of much greater power can be worked, whilst the range and precision of fire are at the same time increased. But these improvements cannot be confined to ourselves. Other nations are increasing the power and range of their artillery in a similar degree, and the energies of the nation must, therefore, be directed to maintain the superiority of our navy in armor as well as in armament.

IRON BRIDGES.

We have already seen a new era in the history of the construction of bridges, resulting from the use of iron; and we have only to examine those of the tubular form over the Conway and Menai Straits to be convinced of the durability, strength and lightness of tubular constructions applied to the support of railways or common roads, in spans which, ten years ago, were considered beyond the reach of human skill. When it is considered that stone bridges do not exceed one hundred and fifty feet in span, nor cast-iron bridges two hundred and fifty feet, we can estimate the progress which has been made in crossing rivers four hundred or five hundred feet in width, without any support at the middle of the stream. Even spans, greatly in excess of this, may be bridged over with safety, provided we do not exceed eighteen hundred to two thousand feet, when the structure would be destroyed by its own weight.

SUPPLY OF WATER FOR LONDON.

We may reasonably look forward to an extension of similar benefits to the metropolis, by the same engineer, Mr. Bateman, whose energies are now directed to an examination of the pure fountains of Wales, from whence the future supply of water to the great city is likely to be derived. A work of so gigantic a character may be looked upon as problematical, but when it is known that six or seven millions of money would be sufficient for its execution, I can see no reason why an undertaking of so much consequence to the health of London should not ultimately be accomplished.

OCEAN TELEGRAPHY.

It is well known that three conditions are essential to success in the construction of ocean telegraphs—perfect insulation, external protection and appropriate apparatus for laying the cable safely on its ocean bed. That we are far from having succeeded in fulfilling these conditions is evident from the fact that out of twelve thousand miles of submarine cable which have been laid since 1851, only three thousand miles are actually in working order; so that three-fourths may be considered as a failure and loss to the country. The insulators hitherto employed are subject to deterioration from mechanical violence, from chemical decomposition or decay, and from the absorption of water; but the last circumstance does not appear to influence seriously the durability of cables. Electrically, india rubber possesses high advantages, and, next to it, Wray's compound and pure gutta percha far surpass the commercial gutta percha hitherto employed; but it remains to be seen whether the mechanical and commercial difficulties in the employment of these new materials can be successfully overcome. The external protecting covering is still a subject of anxious consideration. The objections to iron wire are its weight and liability to corrosion. Hemp has been substituted, but at present with no satisfactory result. All these difficulties, together with those connected with the coiling and paying out of the cable, will no doubt yield to careful experiment and the employment of proper instruments in its construction and its final deposit on the bed of the ocean.

Reopening of the Polytechnic College.

This institution commenced its Ninth Annual Session in Philadelphia on the 16th ult., after a vacation of nine weeks. Advantage has been taken of the interval to increase and rearrange the cabinets of mineralogy, geology and paleontology, to refit the chemical laboratory and add to the instruments and other apparatus of illustration. The faculty has been increased in numbers and efficiency by the appointment of Col. Charles M. Eakin, formerly instructor at West Point, as Superintendent of Military Instruction, and Mr. Emil Pollmer, formerly of the Royal School of Mines, Freiberg, Saxony, as assistant in the Schools of Mines and Chemistry. The other members of the faculty are Henry Vethake, LL. D., Professor of Higher Mathematics; L. Geo. Franck, C. E., Professor of Engineering, Mechanics, Architecture and Drawing; Alfred L. Kennedy, M. D., Professor of Geology, Mineralogy and of General and Applied Chemistry; Furman Sheppard, A. M., Lecturer on Industrial Jurisprudence; V. de Amarelli, LL. D., Ph. D., Professor of Modern Languages and Literature; D. Dwight Willard, Adjunct Professor of Mathematics and Instructor in Scientific School; and J. F. Holt, M. D., Instructor in Scientific School. The classes of the Polytechnic are annually increasing in numbers.

GALVANIZING CAST IRON.—The *Moniteur du Commerce* says that all the difficulties of coating cast iron with copper by the galvanic process have been overcome by M. Oudry, of Paris, by the simple process of varnishing the iron before placing it in the bath. The *Moniteur* states that there are in the *Bois de Boulogne* three kinds of candelebra, the first in bronze, the second in cast iron painted, and the third in cast iron covered with copper by M. Oudry's process; and those of the last kind alone have preserved their luster. "They are as brilliant and perfect as at the moment of coming from the work shop." The kind of varnish employed is not given.

On the Manufacture of Collodion.

The following record of experiments are given in the *Journal of Maryland College*, by Mr. Wm. S. Thompson. He says:—

For the purpose of testing the solubility of the cotton in menstrua of ether and alcohol mixed in various proportions, I prepared a series of three, which I will designate by numbers, as follows:—

No. 1.

Ether, parts, by measure..... 5
Alcohol, do. 1

No. 2.

Ether, parts, by measure..... 4
Alcohol, do. 1

No. 3.

Ether, parts, by measure..... 3
Alcohol, do. 1

FIRST EXPERIMENT.

Sixty grains of carded cotton were immersed in the following mixture: Nitric acid (sp. gr. 1.41), 1 fluid ounce; sulphuric acid (commercial), 1 fluid ounce. Having mixed the acids in a shallow porcelain dish, the temperature rose to 90° Fah., and fell to 80° Fah., when the cotton was immersed. At the expiration of ten minutes, the cotton was thorougly washed with water and dried at a low temperature. One part of this cotton and 150 parts by weight of menstruum No. 1 formed a very thick collodion, leaving a small quantity of undissolved sediment. With menstruum No. 2, in the some proportion, it also formed a good collodion, with about the same amount of sediment as in No. 1. With menstruum No. 3, in the same proportion, it formed a thick collodion with scarcely a trace of sediment or undissolved cotton.

SECOND EXPERIMENT.

Sixty grains of cotton were immersed in the acid mixture in the same proportion as in the first experiment, in a deep porcelain mortar. Upon mixing the acids, the temperature rose to 105° Fah., and fell to 95° upon immersing the cotton. By this experiment, a more soluble cotton was formed than in the first experiment; but menstruum No. 3 proved to be the best solvent.

THIRD EXPERIMENT.

This experiment was made with double the amount of material used in the preceding, in the same mortar. Upon mixing the acids, the temperature rose to 120° Fah., and fell to 110° Fah. when the cotton was immersed. The resulting cotton was entirely soluble in menstruum No. 3, but with Nos. 1 and 2, leaving a small quantity of sediment.

From the foregoing experiments, I infer that an elevated temperature, say from 110° to 130° Fah., is favorable to the formation of a very soluble collodion cotton, and that a menstruum containing a large proportion of alcohol is the best solvent.

Ginseng for China.

A short time ago no less than fifty tuns of ginseng was shipped from St. Paul's, Minn., for China, *via* New York. We receive tea and silk and pig tails from the Mandarins, and in return send cotton cloth, ginseng and gold. No less than one hundred and fifty tuns of ginseng are sent from Minnesota annually, all of which, we believe, goes to China. It is shipped in casks which contain about two hundred and fifty pounds each, and the price is about eighty cents per pound. It is said to be quite a profitable herb to dig up for export. It grows in the Northern, Middle and Western States, and the root is largely used as a favorite medical drug by the descendants of Shem in China.

Ginseng contains starch, gum, resin and a peculiar essential oil. Before it is taken as a medicine the custom pursued by each Chinaman is to rest in quietude for several hours, communing with the ghosts of his forefathers; afterward it is a sure cure, we suppose.

EIGHTY YEARS' PROGRESS OF THE UNITED STATES.—We have received from the publisher, L. Stebbins, of Worcester, Mass., a work in two large volumes bearing the above title. It is designed to show the various channels of industry and education through which the people of the United States have arisen from a British colony to their present national importance. It contains elaborately illustrated articles on the fur trade, the hat manufacture, improvements in the means of travel and transportation, manufactures of cotton, wool, paper, leather, boots and shoes, firearms, cutlery, carriages and coaches, clocks and watches, electroplated ware, pins, refined sugars, silk, fireproof safes, bank locks, glass, india-rubber, &c., &c., &c. It contains a vast mass of valuable information in a form accessible to all, and we think every family in the land ought to possess a set of these volumes for ready reference.

THE ROTHSCHILDS are now chief owners of the London *Times*. Suspicious people see in this fact an explanation of its persistent attacks upon American credit, which they hope will enable them to get the loan cheaper. It would be singular if we should bring the war to a close without going to Jew or Gentile in England for help.

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Testing Tubes.

We have received a pamphlet by Charles Legge, Civil Engineer, entitled "A Glance at Victoria Bridge," giving a very interesting history of the rise and progress of that gigantic structure. The author gives the following account of the manner in which the great tubes were tested, and of his personal experience in connection with the experiment :—

On the 15th of December, preparations were completed for a final test of the strength of the tubes; singularly enough at the same time, with the close of navigation, when vast fields of ice, under nature's superintendence, were hurling their solid masses against the masonry of the piers and testing their efficiency and strength by over one million tuns a minute. Any force or weight man could bring into comparison with this, would be puny in the extreme.

Yet notwithstanding the inability of competing with nature's test, a load had been obtained such as seldom before was seen for a like purpose. A train of platform cars 520 feet in length, extending over two tubes, was loaded, almost to the breaking limit of the cars, with large blocks of stones, and in readiness for the experiment.

Prior to this a steel wire was extended the entire length of the tubes for the purpose of measuring the deflection, and strained by heavy weights as tightly as possible over pulleys at every bearing of the tube. This wire formed the datum from which all movements were to be measured on slips of card attached to vertical staves at various points along the tube.

During the two days occupied with the test the public were rigorously excluded, none being admitted by Mr. Hodges to witness the experiment but Mr. Keefer, Deputy Commissioner of Public Works, Canada, the engineers belonging to his staff, with Mr. Ross, and the two engineers from England. At each slip of paper one of his assistants was placed and provided with a lamp and a pencil by which to make the necessary marks.

The loaded train was then taken hold of by two of the most powerful engines belonging to the Grand Trunk and, with extreme difficulty from the great weight, brought into the first two tubes, beyond which all their united efforts failed to draw it. A third engine having been obtained, the three were barely able to force the load along to the centre of the bridge; when night coming on, the test of the remaining portion of the bridge was deferred until the following day.

Early next morning, the interesting experiment was resumed, and concluded during the day.

In giving the result of the fearful ordeal to which the tubes were subjected, we will only note the deflection on a pair of the side tubes, the others being similar, and the central one.

When the train covered the first tube, the deflection in the centre amounted to $\frac{7}{8}$ of an inch, and the adjoining one, to which it was coupled, was lifted in the middle $\frac{3}{8}$ of an inch. The load then being placed over both tubes, the deflection was the same in each, or $\frac{3}{4}$ of an inch in the middle; and on being entirely removed, both tubes resumed their original level.

The large centre span, entirely disconnected from the other tubes, on being covered with the load throughout its entire length, deflected in the centre only $1\frac{1}{2}$ inches, and came back to its previous level on the load being removed.

All these results were considered highly satisfactory, as being considerably within the calculated deflection for such a load according to formulæ well known and generally made use of.

Nothing exemplified more strongly the confidence felt by Mr. Hodges in the strength of the work, than the severe test to which he exposed it. The writer well remembers the "peculiar feelings" he experienced when standing at the marking-post assigned him, surrounded at the same time by an Egyptian darkness, dense enough to be felt, arising from the condensed steam and the smoke of the engines, and totally obscuring the light of a glass lamp two feet distant. To thus stand closely pressed up against the side of the tube, with eyes and lamp brought within a few inches of the datum-line intently watching its movements, and leaving but sufficient room for the slipping, groaning, puffing but invisible engines and their heavily loaded cars to pass, with but a quarter of an inch of boiler-plate between time and eternity; or when mentally reasoned back to safety and security, and while listening, during the stoppage of the train, to the surging, cracking, crashing ice far below, as it swept past, to have those feelings of personal security dissipated in a moment by the thought of an over-loaded car breaking down and burying the deflection-observer beneath its weight, was surely reason enough for the existence of the "peculiar feelings" alluded to.

NEW METHOD OF TRANSMITTING SIMULTANEOUSLY TWO DISPATCHES ON ONE WIRE.

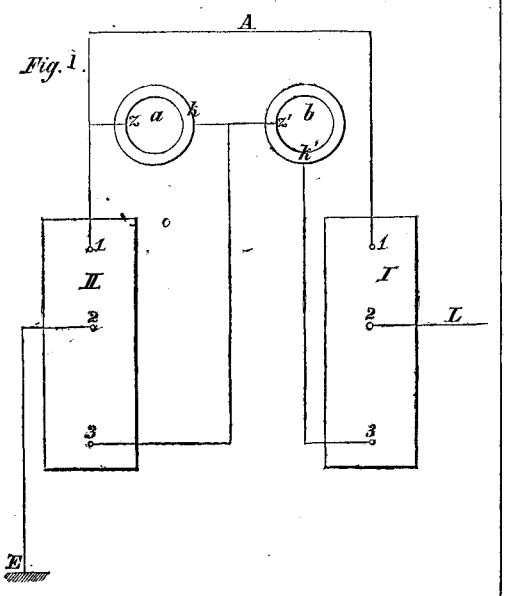
[Translated from the Journal of the Austrian Telegraph Association.]

In order to transmit two dispatches from one station to another simultaneously through one wire, the instruments have to be so arranged that the same make four different results possible in the four different cases. In transmitting two dispatches simultaneously in the same direction through the same wire, either two signals have to be transmitted at once, or one signal of the first or one signal of the second dispatch only, or, finally, no signal at all. Those four cases must be distinguishable at the transmitting station, and particularly at the receiving station.

In the transmitting station two ordinary Morse keys, I and II, Fig. 1, are employed. The fulcrum, 2, of the key, 1, is connected with the line wire, L, and the fulcrum of the key, II, with the earth, E. The working contact, 3, of the first key connects with the rest contact of the second key, and in this connection the double line battery, $a\ b$, is inserted. The rest contact of the key, I, connects with the rest contact, i, of the key, II, and consequently with the zinc pole, z, of the battery, a; and, finally, a wire extends from the working contact, 3, of the second key to the wire connecting the copper pole, k, of the battery, a, with the zinc pole, z', of the battery, b. In transmitting two dispatches simultaneously, one through each key, the following four cases may occur :—

First, Two signals are transmitted simultaneously. In this case both keys are depressed, and the battery, b, is closed; a positive current passes from its copper pole, k', through 3 and 2 of the key, I, and through the line wire, L, to the receiving station, B, thence down into the earth, and through 2 and 3, of the key, II, back to the zinc pole, z', of the battery, b.

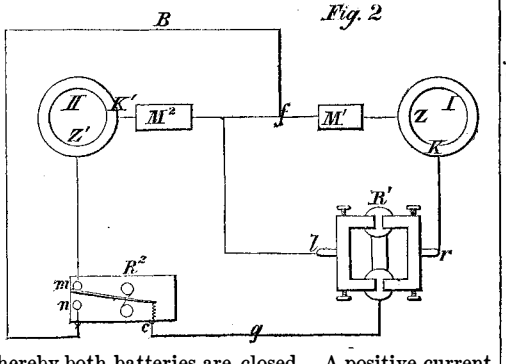
Fig. 1.



Second, One signal of the second dispatch only to be transmitted. In this case the key, II, is depressed and the battery, a, is closed, and a current of equal power passes in an opposite direction through the line wire. If the former current is positive, this is negative, passing from the zinc pole, z, of the battery, a, through 1 and 2 of the key, I, and through L to the receiving station, thence to the earth and through the earth, and 2 and 3 of the key, II, back to the copper pole of the battery, a.

Third, To transmit one signal of the first dispatch only. In this case the key, I, is depressed, and

Fig. 2



thereby both batteries are closed. A positive current of double power passes through the line wire, starting from the copper pole, k', in the battery, b, through 3 and 2 of the key, I, and through L to the receiving station, thence down into the earth, and from E, through 2 and 1 of the key, I, to the zinc pole of the battery, a.

Fourth, To transmit no signal. In this case neither of the keys is depressed, and no current passes through the line wire.

The four cases in transmitting therefore are as follow :—Single positive current; single negative current; double positive current; no current.

In the receiving station three different receiving instruments are employed, one to be operated by the negative, the other by the single positive, and the last by the double positive currents. This latter instrument consists of an ordinary relay, R2, Fig. 2, the armature of which vibrates between the two points of contact, m and n, the point, c, being continually connected with said armature. When at rest, the armature is in contact with the point, m, and it is brought in contact with the point, n, whenever a positive current of double power passes through the line wire.

The first and second receiving instruments consist of a double relay, R1, connected and provided with two armatures, r and l, the armature, l, being operated by negative, and the armature, r, by positive currents of ordinary power.

The balance of the fixtures of the receiving station will be easily understood. M′ and M2 represent the two Morse instruments; I and II two local batteries, the copper pole, K, of the first being connected with the armature, r, and its zinc pole, Z, with one end of the helix of the instrument, M′, while the other end of this helix is connected by means of the wire, f, with the first end of the helix in the instrument, M2, and the second end of the latter with the copper pole of the local battery, II. The zinc pole of this local battery connects with the point, m, of the relay, R2, and the point, n, of this relay is connected with the wire, f, between the two instruments, M′ and M2. Finally, the armature of the relay, R2, connects through the point, c, and wire, g, with the cores of the relay, R′, and the armature, l, of this relay is connected with the wire, f, between the instruments, M′ and M2. Consequently the relay, R′, is inserted in such a manner that the local current always passes through the cores of the electro-magnets in R′, and through the wire, g; the line current, on the other hand, circulates round the cores of the relays, R′ and R2, one after the other. The spring of the relay, R2, has a greater tension than that of the relay, R′, and in order to be able to regulate both springs simultaneously, according to the power of the current, they connect both to one nut, which serves to adjust the springs. The four different cases of transmitting signals produce the following results on the receiving station :—

1st. Two signals given; that is, a single positive current in the line wire. By this current the the armature, r, is attracted, while the armature of R2 remains in contact with the point, m; both local batteries are closed, the current passing from K, in the battery, I, through r and g, to c, and through m to Z′ and K′ of the battery, II, and through M2, f and M′, to the zinc pole, Z, in I. Both instruments, M′ and M2, operate and produce the signal on the paper. Both local batteries being closed the local current has sufficient power to operate both instruments.

2d. One signal of the second dispatch given; that is, a single negative current in the line wire. By this current the armature, l, of the relay, R′ is attracted, and the armature of R2, remains still in contact with the point, m; by this the local battery, II, only is closed and its current passes from K′ through M2, and f to l, thence through g, c and m, back to Z′, in II. The signal of the key, II, therefore, is recorded by the instrument, M2.

3d. One signal of the first dispatch given; that is, a double positive current in the line wire. By this current the armature of the relay, R2, is brought from the point, m to n, and at the same time the armature r, of the relay, R′, is attracted and brought in contact with the core; by this the local battery, I, is closed and its current passes from K through r and g to c, thence to n, and through h, f and M′, back to the zinc pole, Z, of the battery, I. The signal of the key, I, is recorded by the instrument, M′.

4th. No signal is transmitted, that is, no current in the line wire. In this case neither the local battery, I, nor II is closed, since the armatures of both relays remain unaffected, and consequently no signal is recorded by either of the instruments, M′ M2.

It remains to describe the arrangement of the several instruments for transmitting and recording two dispatches sent simultaneously through the same wire in opposite directions.

The district immediately around Manchester, England, contains two hundred cotton manufacturing settlements. The amount of English capital embarked in the cotton manufacture in 1836 was £35,000.000. In 1861 it is £100,000,000.

State and county fairs are now in full blast all through the Eastern and Western States, and appear to be kept up with unflagging interest. The exhibitions of agricultural products, too, appear to be as good as usual.

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The Marquis of Worcester's "Century of Inventions."

BY JOHN TIMBS, F.R.S.

As the tourist passes by the right of the Abergavenny or great road from Monmouthshire into Wales, he will scarcely fail to notice the picturesque remains of Raglan Castle, "the most perfect decorated stronghold of which this country can boast—a romance in stone and lime." Its historic interest can be traced through five centuries; but its culminating point was during the war with Henry, fifth Earl and first Marquis of Worcester, who, in his eighty-sixth year, made here a desperate struggle in favor of King Charles I., Raglan being the last castle throughout this broad realm which defied the power of Cromwell. In 1642, the Marquis raised and supported an army of 1,500 foot and near 500 horse soldiers, which he placed under the command of his son, Lord Herbert, who, succeeding his father, became better known as the Marquis of Worcester, who left in manuscript the "Century of Inventions." During the civil commotions Charles made several visits to Raglan, and on these occasions particularly distinguished the young Lord Herbert, whom his Majesty subsequently invested with the command of a large body of troops. His bravery and devotedness to the royal cause led to his being commissioned by the King in Ireland, failing in which, the Marquis embarked for France. Meanwhile, Raglan was surrendered to the Parliamentary forces; we do not hear of the young Marquis until 1664, when we find him attached to the suite of Charles II., who then resided at the court of France; and in the following year he was dispatched by the exiled monarch to London, for the purpose of procuring private intelligence and supplies of money, of which the King was in the greatest need. Worcester was, however, speedily discovered, and committed a close prisoner to the Tower, where he remained in captivity for several years; he was set free at the Restoration. Of his lordship's private life we find few records. He probably found leisure for the scientific pursuits, to which he was much attached, during his sojourn in France, where he wrote the first manuscript of his "Century of Inventions," the notes of which he appears to have lost; but he rewrote them, it is said, after his committal to the Tower. This we infer from the manuscript now in the possession of the Beaufort family, which opens thus :—

A
CENTURY
OF THE
NAMES AND SCANTLINGS
OF SUCH
INVENTIONS

As at present I can call to mind to have tried and perfected; which (my former notes being lost) I have, at the instance of a powerful friend, endeavored now in the year 1665 to set these down in such a way as may sufficiently instruct me to put any of them in practice.

Artis et Naturæ proles.

During the usurpation, Worcester House, in the Strand, the London residence of the Marquis, was sold by Parliament, but at the Restoration it reverted to his lordship, who leased the house to the great Lord Clarendon, who resided here until the erection of his new house at the top of St. James's street.

In 1663 appeared the first edition of the Marquis's "Century of Inventions;" and on April 3d, in the same year, a bill was brought into Parliament for granting to Worcester and his successors the whole of the profits that might arise from the use of an engine described in the last article in the "Century." Lord Orford describes this bill to have passed on the simple affirmation of the discovery that he (the Marquis) had made; but the journals of the Lords and Commons for 1663–4 show there were no less than seven meetings of committees on the subject, composed of some of the most learned men in the House, who, after considerable amendments, finally passed the bill on the 12th of May.

There is anecdotic evidence of the latter portion of the "Century," at least, being written by the author while confined in the Tower. It is said that he was preparing some food in his apartment when the cover of the vessel, having been closely fitted, was, by the expansion of the steam, suddenly forced off and driven up the chimney. This circumstance attracting the Marquis's attention, led him to a train of thought which terminated in the completion of the above invention, which he denominated a "Water Commanding Engine."

Lord Worcester's engine was shown in operation; and when Cosmo de Medici, Grand Duke of Saxony, visited England in 1656 (at which time the Marquis was a close prisoner in the Tower), his invention was exhibited at Lambeth, as thus recorded in the Grand Duke's dairy :—

His Highness went "beyond the palace of the Archbishop of Canterbury to see an hydraulic machine, invented by my Lord Somerset, Marquis of Worcester. It raises water more than forty geometrical feet by the power of one man only; and in a very short space of time will draw up four vessels of water through a tube or channel not more than a span in width."

Precisely four years after the bill was brought into Parliament for securing the above invention, viz., upon April 3, 1667, the Marquis died in retirement near London, and his remains were conveyed with funeral solemnity to the vault of the Beaufort family in Raglan Church.

Worcester has been illiberally described as a "fantastic projector," and his "Century" as "an amazing piece of folly." But Mr. Partington, in his edition of the work published in 1825, has, throughout an able series of notes, fully demonstrated not only the practicability of applying the major part of the hundred inventions there described, but the absolute application of many of them, though under other names, to some of the most useful purposes of life. It is surely injustice and ingratitude to apply the name of a "fantastic projector" to the man who first discovered a mode of applying steam as a mechanical agent—an invention alone sufficient to immortalize the age in which he lived.

Many of Worcester's contrivances have since been brought into general use; among them may especially be mentioned stenography, telegraphs, floating baths, speaking statues, carriages from which horses can be disengaged if unruly, combination locks, secret escutcheons for locks, candle molds, &c.

We have not the space to do more than quote the table of the inventions, which will convey some idea of their great variety :—

No.
1. Seals abundantly significant.
2. Private and particular to each owner.
3. A one-line cypher.
4. Reduced to a point.
5. Varied significantly to all the twenty-four letters.
6. A mute and perfect discourse by colors.
7. To hold the same by night.
8. To level cannon by night.
9. A ship-destroying engine.
10. How to be fastened from aloof and under water.
11. How to prevent both.
12. An unsinkable ship.
13. False destroying decks.
14. Multiplied strength in little room.
15. A boat driving against wind and tide.
16. A sea-sailing fort.
17. A pleasant floating garden.
18. An hour glass fountain.
19. A coach-saving engine.
20. A balance water work.
21. A bucket fountain.
22. An ebbing and flowing river.
23. An ebbing and flowing castle clock.
24. A strength increasing spring.
25. A double-drawing engine for weights.
26. A to-and-fro lever.
27. A most easy level draught.
28. A portable bridge.
29. A movable fortification.
30. A rising bulwark.
31. An approaching blind.
32. An universal character.
33. A needle alphabet.
34. A knotted string alphabet.
35. A fringe alphabet.
36. A bracelet alphabet.
37. A pinked glove alphabet.
38. A sieve alphabet.
39. A lantern alphabet.
40. An alphabet by the smell.
41. An alphabet by the taste.
42. An alphabet by the touch.
43. A variation of all and each of these.
44. A key pistol.
45. A most conceited tinder box.
46. An artificial bird.
47. An hour water ball.
48. A screwed ascent of stairs.
49. A tobacco tongs engine.
50. A pocket ladder.
51. A rule of gradation.

No.
52. A mystical jangling of bells.
53. An hollowing of a water screw.
54. A transparent water screw.
55. A double water screw.
56. An advantageous change of centers.
57. A constant water flowing and ebbing motion.
58. An often-discharging pistol.
59. An especial way for carabines.
60. A flask charger.
61. A way for musquets.
62. A way for a harquebus, a crock or ship musket.
63. For sakers and minyons.
64. For the biggest cannon.
65. For a whole side of ship muskets.
66. For guarding several avenues to a town.
67. For muskuetoons on horseback.
68. A fire water work.
69. A triangle key.
70. A rose key.
71. A square key with a turning screw.
72. An escutcheon for all locks.
73. A transmittable gallery.
74. A conceited door.
75. A discourse woven on tape or ribbon.
76. To write in the dark.
77. A flying man.
78. A continually-going watch.
79. A total locking of cabinet boxes.
80. Light pistol barrels.
81. A comb conveyance for letters.
82. A knife, spoon or fork conveyance.
83. A rasping mill.
84. An arithmetical instrument.
85. An untoothsome pear.
86. An imprisoning chair.
87. A candle mold.
88. A coining engine; a brazen head.
89. Primero gloves.
90. A dicing box.
91. An artificial ring horse.
92. A gravel engine.
93. A ship-raising engine.
94. A pocket engine to open any door.
95. A double cross bow.
96. A way for sea banks.
97. A perspective instrument.

The last three of the list—Nos. 98, 99 and 100—are described more in detail, as follows :—

98. An engine, so contrived that working the *primum mobile* forward or backward, upward or downward, circularly or cornerwise, to and fro, straight, upright or downright, yet the pretended operation continueth and advanceth; none of the motions above mentioned hindering, much less stopping the other; but unanimously, and with harmony agreeing, they all augment and contribute strength unto the intended work and operation; and therefore I call this a *semi-omnipotent engine*, and do intend that a model thereof be buried with me.

99. How to make one pound weight to raise one hundred as high as one pound falleth, and yet the hundred pounds descending doth what nothing less than one hundred pounds can effect.

100. Upon so potent a help as these two last-mentioned inventions, a water work is, by many years' experience and labor, so advantageously by me contrived that a child's force bringeth up an hundred feet high an incredible quantity of water, even two feet diameter. And I may boldly call it *the most stupendous work in the whole world*, not only with little charge to drain all sorts of mines and furnish cities with water, though never so high seated, as well as to keep them sweet, running through several streets, and so performing the work of scavengers, as well as furnishing the inhabitants with sufficient water for their private occasions, but likewise supplying the rivers with sufficient to maintain and make navigable from town to town, and for the bettering of lands all the way it runs; with many more advantages, and yet greater effects of profit, admiration and consequence; so that deservedly I deem this invention to crown my labors, to reward my expenses, and make my thoughts acquiesce in way of further inventions. This making up the whole "Century," and preventing any further trouble to the reader for the present, meaning to leave to posterity a book wherein, under each of these heads, the means to put in execution and visible trial all and every of these inventions, with the shape and form of all things belonging to them, shall be printed by brass plates. Besides many omitted, and some of three sorts willingly not set down, as not fit to be divulged, lest ill use might be made thereof, but to show that such things are also within my knowledge, I will here in myne owne cypher sett downe one of each, not to be concealed when duty and affection obligeth me.

The last three inventions, says Mr. Partington, may justly be considered as the most important of the whole "Century;" and when united with the 68th article, they appear to suggest nearly all the data essential for the construction of a modern steam engine. The 68th article is as follows :—

An admirable and most forcible way to drive up water by fire, not by drawing or sucking it upwards, for that must be, as the philosopher calleth it, *infra sphœram activitatis*, which is but at such a distance. But this way hath no bounder, if the vessels be strong enough; for I have taken a piece of a whole cannon, whereof the end was burned, and filled it three-quarters full, stopping and screwing up the broken end, as also the touchhole; and making a constant fire under it, within twenty-four hours it burst and made a great crack: so that having found a way to make my vessels, so that they are strengthened by the force within them, and the one to fill after the other, have seen the water run like a constant fountain stream forty feet high; one vessel of water, rarefied by fire, driveth up forty of cold water; and a man that tends the work is but to turn two cocks, that one vessel of water being consumed, another begins to force and refill with cold water, and so successively, &c.

The Marquis has also furnished us with a "Definition" of the above engine, which is exceedingly rare, as the only copy known to be extant is preserved in the British Museum. It is printed on a single sheet, without date, and appears to have been written for the purpose of procuring subscriptions for a water company, then about to be established. The invention is described as—

A stupendous, or water-commanding engine, boundless for hight, or quantity, requiring no external, nor even additional help or force to be set or continued in motion, but what intrinsically is afforded from its own operations, nor yet the twentieth part thereof. And the engine consisteth of the following particulars:

"A perfect counterpoise for what quantity soever of water.

"A perfect countervail for what hight soever it is to be brought unto.

"A *primum mobile* commanding both hight and quantity, regulator-wise.

"A vicegerent, or countervail, supplying the place and performing the full force of man, wind, beast, or mill.

"A helm, or stern, with bit and reins, wherewith any child may guide, order, and control the whole operation.

"A particular magazine for water, according to the intended quantity or hight of water.

"An aqueduct capable of any intended quantity or hight of water.

"A place for the original fountain or river to run into, and naturally of its own accord incorporate itself with the rising water, and at the very bottom of the aqueduct, though never so big or high.

"By Divine Providence, and heavenly inspiration, this is my stupendous water-commanding engine, boundless for hight and quantity.

"Whosoever is master of weight, is master of force; whosoever is master of water, is master of both; and consequently to him all forcible actions and atchievements are easie."

Among the documents in the possession of the Duke of Beaufort is the following impressive memorial of the success of the engine and the pious gratitude of the inventor :—

The Lord Marquesse of Worcester's ejaculatory and extemporary thanksgiving Prayer, when firstwith his corporal eyes he did see finished a perfect trial of his Water-commanding Engine, delightful and useful to whomsoever hath in recommendation either knowledge, profit, or pleasure.

Oh! infinitely omnipotent God! whose mercies are fathomlesse, and whose knowledge is immence and inexhaustible; next to my creation and redemption I render thee most humble thanks from the very bottom of my heart and bowels, for thy vouchsafing me, (the meanest in understanding,) an insight in soe great a secret of nature, benificent to all mankind, as this my water-commanding engine. Suffer me not to be puffed upp, O Lord, by the knowing of it, and many more rare and unheard off, yea unparalleled inventions, tryals, and experiments. But humble my haughty heart, by the true knowledge of myne own ignorant, weake, and unworthy nature: proane to all evill, O most mercifull Father my creator, most compassionating Sonne my redeemer, and Holyest of Spiritts, the sanctifier, three divine persons, and one God, grant me a further concurring grace with fortitude to take hould of thy goodness, to the end that whatever I doe, unanimously and courageously to serve my kind and country, to disabuse, rectifie, and convert my undeserved, yet wilfully incredulous enemyes, to reimburse thankfully my creditors, to reimmunerate my benefactors, to reinhearten my distressed family, and with complacence to gratifie my suffer-

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ing and confiding friends, may, voyde of vanity or selfe ends, be only directed to thy honor and glory everlastingly. Amen.

As the pensive tourist strays amidst the desolate courts and roofless halls of Raglan, or views from its battlements the golden glories of sunset, he may reflect upon the vicissitudes of the noble owners of this "famous castle fine;" and should the visitor extend his walk to the burial place of the Beauforts in Raglan Church, he will there see the arched stone vault which enshrines the remains of Edward, Marquis of Worcester.

Of his greatest invention no record has been preserved beyond the articles to which reference has been made in the present *précis* of his labors; but in our day Professor Millington has designed an engine on similar principles, and which, with a few alterations, might be made available for the purposes recommended by our author.

In the "Transactions of the Society of Arts," Vol. III., p. 6, is recommended to the attention of every mechanic the "Century," "which, on account of the seeming improbability of discovering many things mentioned therein, has been too much neglected; but when it is considered that some of the contrivances, apparently not the least abstruse, have by close application been found to answer all that the Marquis says of them, and that the first hint of that most powerful machine, the Steam-engine, is given in that work, it is unnecessary to enlarge on the utility of it."

Manufacture of Rails and Armor Plates.

The following is the substance of a paper read before the Institution of Mechanical Engineers, by Mr. John Brown, of Sheffield, and published in the London *Mechanics' Magazine*:—

After alluding to the great importance of the quality of railway bars, and to their ordinarily brief duration under heavy traffic, the author referred to two modes which had been practiced to some extent, and the object of which was to increase the hardness of the wearing surfaces, and thus to prolong their duration. The first of these was the rolling of a steel bar along with the iron bars of the rail pile, so as to form the bead or wearing surface of the rail. The second was the process of partially converting or case hardening the wearing surfaces of an ordinary rail after it had been manufactured in the usual manner. Both of these processes fulfilled their purpose to a certain extent, but by neither was the resistance of the iron increased throughout the whole body of the rail, nor did either prevent lamination between the imperfectly welded bars forming the pile. Although it was admitted that the life of the rail was prolonged by these processes, the extent of this prolongation was uncertain. Mr. Bessemer's mode, however, of converting pig iron into either malleable iron or steel furnished a pure, homogeneous, hard and tough material, admirably adapted for the purposes of rail making. And although rails thus made were expensive in first cost, it was believed that in certain situations—as for crossings, and in the neighborhood of important stations—it would be economy to substitute them for iron. In making rails the ingot of steel was made of the right size, in each case, for a single rail. Thus, for a rail 18 feet long, and weighing 84 pounds to the yard, an ingot of steel was cast 9 inches square, and 26 inches long; this ingot being heated and hammered to 6 inches square and 5 feet long, and afterward rolled out in the usual manner. It was as easy to make long as short rails, and the process, so far as facility of manufacture was concerned, had some advantage over the ordinary mode of piling. The Bessemer rails had no tendency to laminate, and their toughness and ductility were shown by a number of samples upon the table, these samples being short lengths of heavy rails, which had been bent and twisted in an extraordinary manner, and without the least appearance of fracture. The tensile strength of these rails was, at the same time, upward of forty tuns per square inch. Cast-steel rails, it was stated, were not an absolute novelty, the Ebbw Vale Iron Company having made a few several years ago, and which, having been laid on the bridge at the North end of the station at Derby, were still in good order. But as these rails were made from ingots cast by the old process, their cost was such as effectually to preclude their general adoption. They had, nevertheless, proved the great resisting power of steel for the purpose, and now Mr. Bessemer's process enabled the manufacturers to produce, at a moderate price, rails of equally good quality, and which bid fair to constitute real "permanent way."

With regard to the general question of armor plates, the author expressed himself with some hesitation, the results which were finally to determine their application not having yet been definitely ascertained. No limit had yet been assigned to the magnitude of future artillery, nor had any degree of impenetrability of plates been declared as unattainable. The race between the gun and the plate to resist it was still running.

The general question, however, of the applicability of armor plates belonged to the naval architect, while to the ironmaster belonged the question of how to produce the largest plate of iron of the maximum degree of toughness. Two methods of producing large masses of wrought iron are in use, one being "building up" under the hammer, and the other "building up" in the rolls. The general tendency of the hammering process was, it was believed, to produce brittleness—a quality most undesirable in a plate of iron to be subjected to the action of heavy shot at short range. The author criticised, also, the whole mode of making heavy plates from scrap iron and under the steam hammer, believing that, from the original irregularity of the material, it was extremely difficult to obtain a plate of uniform quality. The rolling process, it was contended, produced a tougher and more uniform plate. The difficulty of making armor plates was due to their immense size and weight, and the intolerable heat at which they were worked. The general size of the plates for the mail-clad frigates was from 15 feet to 18 feet long, and from 2 feet 6 inches to 3 feet 10 inches wide, the thickness being 4½ inches. The weight of the finished plate varied, therefore, from 80 cwt. to 140 cwt., from 3 inches to 4 inches being cut off the sides, and from 10 inches to 12 inches from each end after rolling. In respect of waste, it was admitted that the hammer had the advantage over the rolls.

The process of making a five tun plate was described as follows:—Bars are first rolled 12 inches wide and 1 inch thick, and then sheared to a length of 30 inches. Five of these are piled and rolled down to a rough slab. Five more are similarly treated, and these two slabs are then welded and rolled down to a plate 1¼ inch thick, and which is sheared to 4 feet square. Four of these plates are then piled together and rolled down to one 8 feet long, 4 feet wide, and 2½ inches thick, and lastly, four of these, piled together in a mass 8 feet long, 4 feet wide and 10 inches deep, are rolled into the entire plate. There are thus 160 thicknesses of plate, each of which was originally 1 inch thick, in the final plate of 4½ inches. The thickness of each of the original bars is thus reduced to one thirty-fifth of what it was at first, and in all the operations from 3,500 to 4,000 square feet have to be welded together by rolling. It is not surprising that blisters and other defects sometimes exist, and the difficulties in this respect increase in seriousness and magnitude with the weight of the plate. The final job of welding four plates 8 feet by 4 feet by 2½ inches thick, is one of great difficulty. To prevent burning the edges of the pile, and at the same time to complete the whole process while the iron is at a working heat, requires the greatest care, the loss of a few moments being fatal. The four largest plates for the final rolling, are heated in a special furnace, and drawn out by heavy chain tackle upon a truck, which is run upon rails up to the mouth of the rolls, an incline in the tramway to throw the edge of the pile upon the fore-plate. After passing through the rolls the plate is received upon an inclined frame, formed of long rollers; this gives the heated pile a tendency to return, and, at the same moment, the motion of the rolls is reversed, and the plate passes through them in the opposite direction; this to-and-fro movement being repeated until the final thickness of the plate is attained. The plate is then lifted by a crane and placed upon a large cast iron bed-plate. In this position an iron cylinder, weighing 9 tuns, is rolled to and fro over it, to remove the curvature by rolling. As soon as the plate has become sufficiently cooled it is taken to the planing machine, where it is trimmed to its intended size, this operation completing the whole process.

Reducing Silver from Old Baths.

[From La Lamiere.]

Of all the processes that I have tried for reducing silver the following is much the best, and the most expeditious. Having to do so, I reduced the silver from its chloride by zinc and diluted sulphuric acid, then reformed the salt of silver, and after having acidulated it by nitric acid. This last method is very expeditious, but the reduced silver is always mixed with acetate of silver, which produces, on dissolving it in nitric acid, a magma of a brick color, which is scarcely soluble in water, and produces very bad baths. The reduced silver from the chloride is more favorable, but there always remains some chloride unacted upon.

In reducing the chloride in the manner in which I have indicated, the nitrate of silver formed is very pure, and the reduction is made with the greatest facility, when one operates upon small quantities—the only case in which the process is applicable, and which makes me recommend it to amateur photographers.

After reducing and washing the chloride of silver, produced by pouring some hydrochloric acid into the ordinary silver baths, and separating this chloride by aid of a filter, it is placed together in the hollow of a piece of charcoal. I then blow upon this charcoal with an ordinary bellows in such a manner that the flames of the charcoal pass over the chloride. This melts first; then, on continuing to blow, it is very quickly reduced into a piece of metallic silver which is almost entirely free from lead—the only metal which produces an insoluble chloride like that of silver. During the reduction the chloride disengages white fumes and the operation is ended when these cease to appear.

English Patent Law Reform.

At the late Social Science Congress held in Dublin, J. Webster, Esq., read the following resolutions adopted by a committee which had been appointed for the purpose of examining into this subject:—

1. That all applications for grants of letters patent should be subjected to a preliminary investigation before a special tribunal. 2. That such tribunal should have power to decide on the granting of patents, but it should be open to inventors to renew their applications notwithstanding previous refusals. 3. That the said tribunal should be formed by a permanent and salaried judge, assisted, when necessary, by the advice of scientific assessors, and that its sittings should be public. 4. That the same tribunal should have exclusive jurisdiction to try patent causes, subject to a right of appeal. 5. That the jurisdiction of such a tribunal should be extended to the trial of all questions of copyright and registrations of design. 6. That the scientific assessors for the trial of patent causes should be five in number, to be chosen from a panel to be nominated by the Commissioners of Patents, for adjudication upon facts, when deemed necessary by the judge, or demanded by either of the parties. 7. That the right of appeal should be to either of the Courts of Exchequer Chamber, with a final appeal to the House of Lords. 8. That, for the preliminary examination, the assessors, if the judge require their assistance, should be two in number, named by the Commissioners of Patents, from the existing panel, the decision to rest with the judge. 9. That the committee approve of the principle of compelling patentees to grant licenses on terms to be fixed by arbitration, or, in case the parties should not agree to such arbitration, then by the proposed tribunal, or by an arbitrator or arbitrators appointed by the said tribunal. 10. That a report be drawn up in conformity with the resolutions passed by this committee, and that the council, if such report be approved by them, be requested to allow it to be read at the meeting of the British Association, to be held at Manchester this year.

How to make Steel from Scrap Iron.

Take scrap or bar iron cut into small pieces, and place 40 pounds in a crucible with 8 ounces of charcoal in powder and 4 ounces of the black oxyd of manganese. The crucible is covered and then placed in a blast furnace and exposed for about one hour and a half to a high heat. The crucible is now withdrawn and its contents poured into ingot molds, forming cast steel.

BLACK ASPHALT VARNISH.—Take asphaltum 2 lbs., fuse in an iron pot, add of hot boiled oil, 1 pint; mix well, remove the pot from the fire, and, when cooled a little, add oil of turpentine, 2 quarts. Used to black and polish grates and ironwork.

IN Clinton, Mass., there are five factories which have been doing almost nothing for several months past, but they are all expected to go on in full time this month.

THERE are three Western gunboats now being built at Mound City, which are to be named G. B. McClellan, N. P. Banks and Joe Holt. About 300 men are at present employed upon them.

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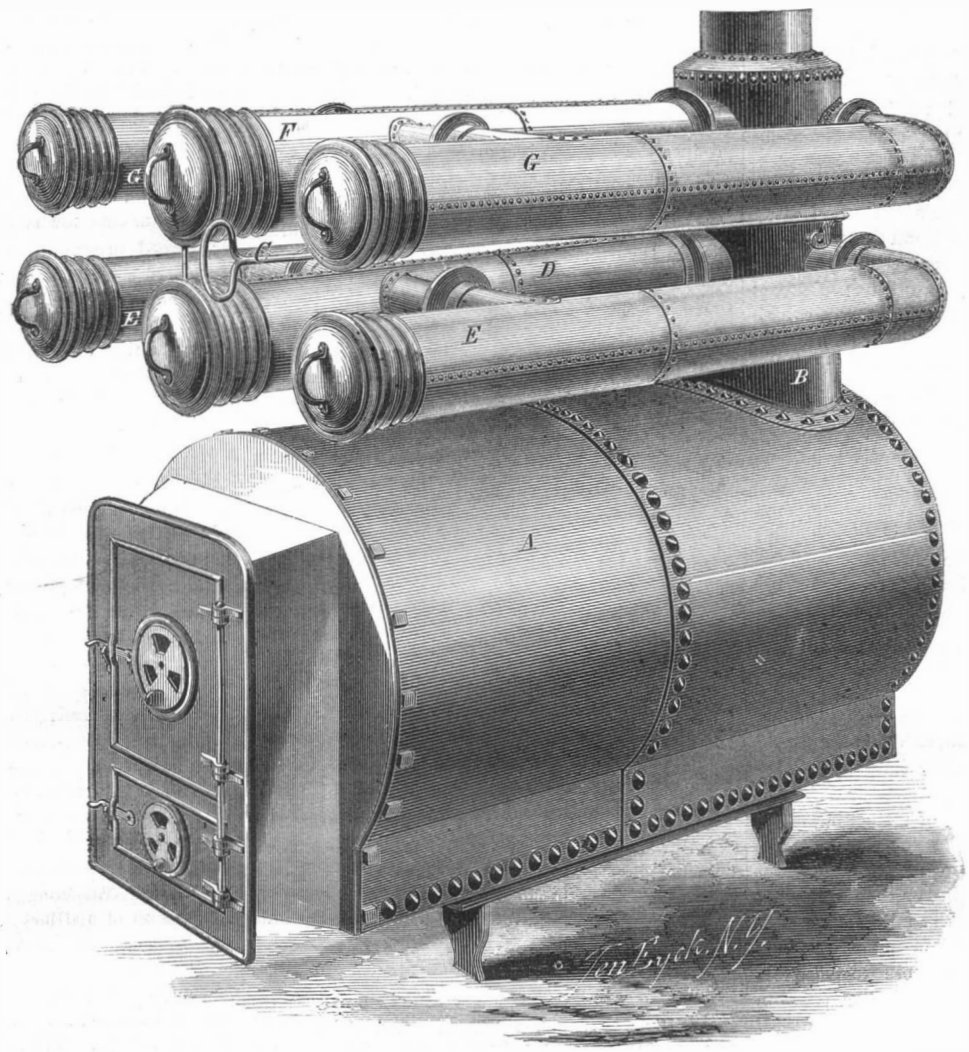
Improved Hot-Air Furnace.

In furnaces for warming dwellings by hot air, if the draft is allowed to pass directly from the fire into the chimney, a very large portion of the heat is wasted, and it is therefore customary to conduct the smoke through a series of pipes or passages so that it may part with the principal portion of its caloric in heating large surfaces which will transmit the heat to the current of air that enters the dwelling. But this interruption of the draft obstructs the combustion of the fuel—an effect not objectionable after the fire is well under way, but causing inconvenience in kindling the fire. The furnace here illustrated, invented by Edwin H. Camp, is designed to overcome this difficulty in a very simple and effectual manner, by opening the drafts directly into the chimney during the process of kindling the fire, and then closing them by dampers so as to send the smoke and heat around through a series of radiating pipes.



CAMP'S HOT-AIR FURNACE.

The engraving is a perspective view of the furnace, which is to be enclosed as usual in a chamber of brickwork. The fire is made in the stove or shell, A, of which B is the chimney. Valves are arranged in the chimney, B, to be opened or closed by means of the rod, C, and while the fire is being started these valves are opened, so as to allow the smoke to pass directly up the chimney. When the fire gets sufficiently kindled the valves in the chimney are closed, so that they send the products of combustion first through the middle pipe, D, of the lower horizontal series, then back through the two outer pipes, E E, of this series into the chimney, where they are turned by a second valve through the middle pipe, F, of the upper series, and return in their final passage to the chimney through the two outer pipes, G G, of the upper series.

It will be seen that the air in the air chamber is exposed to a very large heating surface, and that the smoke and other products of combustion must part with nearly all of their caloric before they escape into the chimney.

The patent for this invention was procured through the Scientific American Patent Agency, Aug. 6, 1861, and further information in relation to it may be obtained by addressing the inventor, Edwin H. Camp, at Jackson, Michigan.

New York Medical College.

From the new catalogue of the faculty of the New York Medical College and Charity Hospital, just issued, we learn that Charles A. Seely, formerly connected with the Scientific American, succeeds Professor Doremus as Professor of Chemistry and Toxicology. We congratulate the College on the acquisition of this able and learned chemist, and have no doubt that the appointment will prove advantageous to the reputation of the institution.

We perceive that this school, eminently progressive, is adapting its preliminary or fall course of lectures to the times; Professor Carnochan lecturing on amputations, and Professor Raphael on gunshot wounds.

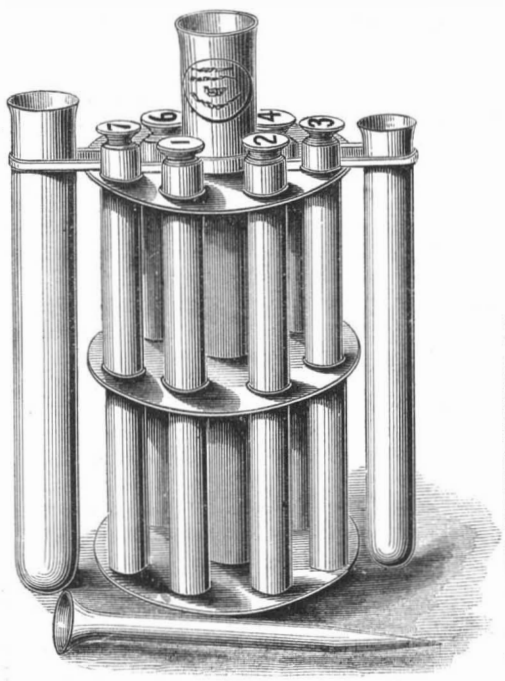
Iron Masts for Vessels.—The London *Times* says that the masts for one of the new iron-plated ships, the *Defence*, are now lying at the Thames Iron Works. Each is 115 feet long by 32 inches wide, and though only a ton heavier than a wooden spar of the same size, is more than ten times as strong.

DANCHELL'S TESTS FOR WATER.

[From the London Engineer.]

We have alluded, on a former occasion, to the pocket case of tests, for ascertaining the impurities of water, fitted up by Mr. F. Hahn Danchell, of No. 5, Red Lion-square, Holborn. A knowledge of the properties of "the water we drink" is so important, and its pursuit so simple and yet interesting, that many of our readers will, we apprehend, desire to enter upon this branch of qualitative analysis, the more so when the requisite materials can be obtained in a form so convenient and attractive, and at so low a price as in the apparatus under notice.

The tests, consisting of substances of which we



shall give a description, sufficient, perhaps, for the purposes of ordinary experimenters, are familiar to every chemist, and are neither mystified nor in any way claimed by Mr. Danchell. He has selected merely the most useful tests, and arranged them in the most convenient form, with test tubes, dropping glass, and full instructions for instant use. The tests, in seven phials, are as follow:—

No. 1. Test for ammonia.—This is a slightly colored solution of zinc, producing, in water containing ammonia, a cloudy appearance. Organic matter may be suspected in water containing ammonia.

No. 2. Test for organic matter.—This is a solution of permanganate of potash, or Condy's fluid, a violet rose or Magenta colored liquid, which, on a few drops being mixed with water containing organic matter, imparts to it a dull, cloudy appearance after an interval varying from a few minutes to a few hours, according to the foulness of the water.

No. 3. Negative test for lead.—This is a solution of acetate of lead. If poured into pure water the lead is taken up without change of color. If poured into water charged with lead the lead cannot be retained in solution, but is precipitated to the bottom, imparting a milky appearance to the water. Water which presents a clear appearance on the addition of No. 3 does not, and cannot contain lead in solution.

No. 4. Positive test for lead.—This is a solution of bichromate of potash, and precipitates lead, if that poison be present in the water experimented upon.

No. 5. Test for bi-carbonate of lime.—This is simply a solution of chalk (carbonate of lime) and acts on the principle of Dr. Clark's process for purifying water from lime.

No. 6. Test for sulphate of lime and sulphuric acid.—This is a solution of baryta in water.

No. 7. Test for iron.—This is a solution of prussiate of potash, and, if the least iron be present, its action is instantaneous and most remarkable. Although the water charged with iron may be almost colorless, and that containing three or four drops of the test solution equally so, they will instantly form, when mixed, an exceedingly dark solution of Prussian blue. If gallic acid were used instead of prussiate of potash the resulting mixture would be black ink.

The whole testing apparatus in enclosed is either a silver-plated, a morocco, or a japanned case, according to price, this case being hardly larger in diameter and no longer than a pocket spy glass.

India Rubber Cement.—A cement called *marine glue* from not being affected by water is made as follows:—Take one pound of india rubber, cut it into small pieces and disolve it in about four gallons of coal-tar naphtha, the mixture being well stirred for some time, till perfect solution has taken place. After ten or twelve days, when the liquid has acquired the consistence of cream, two parts, by weight, of shellac are added to one of the liquid. This mixture is put into an iron vessel having a discharge pipe at the bottom, and heat applied, the whole being kept well stirred. The liquid which flows out of the pipe is spread upon slabs and preserved in the form of plates. When required for use it is heated in an iron pot to about 248° Fah., and applied hot with a brush.

The workmen in the demolition of the old houses near the Tuilleries, Paris, have been assisted lately by railroads of strong wire, which convey down and up to them all the rubbish they must carry away from the destroyed and all the pieces they must insert in the building.

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Scientific American

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY
At No. 37 Park-row (Park Building), New York.

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS—Two Dollars per annum.—One Dollar in advance, and the remainder in six months.
Single copies of the paper are on sale at the office of publication, and at all the periodical stores in the United States and Canada.
Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.
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VOL. V. NO. 14.....[NEW SERIES.]....*Seventeenth Year.*

NEW YORK, SATURDAY, OCTOBER 5, 1861.

INFORMATION AS TO THE PATENTABLE NOVELTY OF INVENTIONS.

The list of claims published from week to week in these columns, indicate truthfully the extent of business being transacted at the Patent Office.

It will be observed that inventors are far from being dormant, if they are not as numerous and active, as they were a year ago. Since the first of July we have received a great accession to the subscription list of this journal, and for the information of each, we would state that it is the custom, at the office of this paper, to examine models or drawings and descriptions of alleged new inventions, and to give written or verbal advice as to their patentability, without charge. Persons having made what they consider improvements in any branch of machinery, and who contemplate securing the same by Letters Patent, are advised to send a sketch or model of it to this office. An examination will be made and an answer returned by early mail. Through our Branch Office, located directly opposite the Patent Office in Washington, we are enabled to make special examinations into the novelty and patentability of inventions. Having the records of the Patent Office to search, and the models and drawings deposited therein to examine, we are enabled to give an inventor most reliable advice as to the probabilities of his obtaining a patent, and also as to the extent of the claim that it is expedient to set up when the papers for an application are prepared. For this special examination at the Patent Office we make a charge of Five Dollars. It is necessary that a drawing and description or a model of the invention should accompany the remittance. Address—

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GOLD COMING AND GOING.

For several months exchange on England has been so low that the tendency has been to bring gold to this country, beside keeping among us all that comes from California. This is an unnatural state of things, and cannot long continue.

Prices of commodities are their values as compared with money or currency. When currency is abundant in any country as compared with other commodities, the effect is to make prices generally high. The result is that that country is a good place to sell articles in, and a poor one to buy them in. The keenness of traders perceives this at once, and merchandize is sent to the country for sale, while the products of the country are bought sparingly, if at all, for sale in other places. Hence, the exports will be small, while the imports will be large and will have to be paid for in money. In this way the currency of the world is brought to its level by a law as inexorable as that which levels the waters of the sea.

As the United States produces far more than its proportion of the gold annually mined in the world, a portion of this *must* go abroad; consequently, the normal condition of things is for exchange on England to be sufficiently high to carry gold to Europe.

It is as undesirable as it is impossible to prevent our surplus product of gold from leaving us. The quantity of *wealth* that a nation wants is unlimited, but all the *currency* that it wants is that which is required in effecting the exchange of its commodities. When we have all the gold we want for this purpose, we act wisely in sending abroad the surplus and getting in exchange for it such articles as we need—tea, coffee, cast steel, &c. All other articles of value are just as much wealth as gold is; and, indeed, gold would have no value at all as currency were it not for the existence of other commodities to be exchanged for each other.

That exchange on England will rise to sufficient hight to carry gold abroad, and will continue generally against us as long as our gold mines are more productive than those of the rest of the world, is a prophecy that may be made with absolute certainty of its being fulfilled. It is so decreed by a law of trade which cannot be overcome nor evaded. It will be understood, however, that if the shipments of California gold should be diverted from New York, and made directly from the Isthmus to Europe, the great cause of exchange being permanently against us would be removed, and European exchange would rise and fall accordingly as we had more or less of our share of the currency of the world.

TRAP QUARRIES---STREET PAVEMENTS.

On the western shore of the Hudson river the lofty and well known Palisades extend for many miles. Their head reclines upon the Highlands while their feet are bathed in the waters of New York Bay. The banks of the Hudson have become classic ground by the genius of Washington Irving. How euphonious and familiar to our ears are the quaint old names of Hoboken and Wehawken. Their mention invokes recollections of quiet summer evening scenes, with swallows twittering around the pointed gables of the old Dutch villas, while an air of subdued immobility reigns over all. But these are only recollections. Modern Progress has numbered the ways and the habits of our progenitors with "the things that were." It turns not aside from its mission by pleasant recollections and rural scenes of the olden time. Its motto is "the greatest good to the greatest number," and palisade and parterre are made subservient to its behests.

The high ridge constituting the Palisades is formed of hard trap rock, and is an excellent enduring material for street pavements, a purpose for which it is now much employed. Stretching for several miles behind Jersey City and Hoboken, the face of the palisade ridge has been converted into a series of quarries. Commencing at the lower extremity and traveling upward to *classic* Wehawken, we hear before us report after report as of marksmen at practice; and mingling with these sounds is heard the clink of drills and hammers. Soon we come in view of quarrymen in squads drilling and blasting, and others busily engaged with hammers in breaking and shaping the rifted trap into small and rectangular blocks. These quarrymen appear to have selected some very inconvenient spots for operation and to have passed by others more favorably located. A few inquiries and a close examination of the rock explain the cause of this. All the rocks in the ridge are not of the same quality. Those which are selected are hard and close in the grain and of a bluish gray color. These are very durable; those which are coarse in the grain and splintery, are left untouched. Extending for several miles, pile succeeds pile of these small blocks, all ready for use, and no superior material for pavements can be found anywhere. We conjectured from appearances that sufficient material had been quarried here to pave several cities, yet the Palisades can furnish trap cubes to cover the streets of every city on this continent without being missed. And it is so conveniently situated, also, that vessels can take in their cargoes at the very foot of the rocks, directly opposite the city.

The blessings of well-paved streets are beyond computation, and according to present appearances New York will soon be the best paved city in the world—a gratifying evidence of our intentions to "mend our ways."

Fourteen years ago every street in the city was paved with cobble stones. In 1848 a section of Fulton street, and another in Broadway, were laid with what is called the Russ pavement, consisting of large granite blocks laid upon a bed of hydraulic cement. This was really the first step toward an improvement in street pavements, but from the first the SCIENTIFIC AMERICAN discountenanced the use of the large blocks, and recommended small granite blocks for the purpose. By reference to page 292, Vol. V. (June 1851), illustrations will be found of several kinds of pavements, the defects of large blocks there clearly shown and the city authorities strongly urged to adopt what is now called the "Belgian pavement." At that time there was not a foot of such pavement in the city; now the miserable cobble stones have been raised from a great number of our oldest streets, and have been supplanted by the "Belgian pavement;" continued progress is now being made to pave every street in the city in the same manner, and in a few years hence this most desirable result will be realized.

SIR WILLIAM ARMSTRONG---IS A PATENT A MONOPOLY?

Sir William Armstrong possesses the happy faculty of rendering himself exceedingly conspicuous. Several years since, Mr. Joseph Whitworth, the distinguished machinist of Manchester, was employed by the British government to make experiments with cannon, and he succeeded admirably in his endeavors to construct superior rifled artillery. An official committee, it has been stated, was appointed to examine and report on the subject, but from some cause not yet explained to the public, the committee failed to do its duty, and in the interval of its silence, Mr. William Armstrong brought a breech-loading rifled cannon before the English cabinet, and had the good fortune to gain the favor of "the power behind the throne." His cannon was soon afterward lauded to the skies by the British press as the greatest gun ever invented by man, and Mr. William soon afterward, through the grace of her Majesty the Queen, became *Sir* William Armstrong, and was appointed government constructer of artillery, and a large fund placed at his disposal. It has since transpired that his guns have been surpassed in range and accuracy by those of the neglected Mr. Whitworth, and that what was held to be essentially new and good in them, was invented by Capt. Blakely and others, whose patents he has been accused of appropriating.

Sir William Armstrong, however, is an extraordinary man, for he has appeared before the public again in the new character of a reformer of law, and the London *Times*, as before in the case of his cannon, appears to be blinded by the smoke of his discharges. The subject to which we allude is the British patent system.

At a recent meeting of the Institution of Mechanical Engineers, held in Sheffield, Sir William, in his opening address, as President, denounced the patent laws as legalizing monopolies. His language has been reviewed in a brilliant and unanswerable argument by the London *Engineer*, which we published on page 167, present Volume of the SCIENTIFIC AMERICAN, and to which we can add nothing. Our object at present in calling up the question is to correct a general misconception respecting the nature of a patent, into which the London *Times*, Sir William Armstrong and many persons in our own country, we believe, have fallen.

Those periodicals in England which have reëchoed the sentiments of Sir William, demanding the abolition of the patent system, have based all their principal arguments upon the idea that a patent is a monopoly, and that patent laws are of the nature of a protective and really a prohibitory tariff system. We assert, without the fear of successful contradiction, that *a patent is not what is strictly known as a monopoly.* A person whose profession has not led him to examine into the nature of inventions and patents, is very liable to be ignorant of this subject; and we thus account for the absence of intelligence in its treatment by the London *Times.* A monopoly, in the strictest sense, means an exclusive power—a grant to practice an art or trade, or enjoy a revenue which is already public property, and which is *well known.*

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This should be free to all. A patent for an invention, on the other hand, is the exclusive grant to enjoy and *practice publicly* for a limited term of years, *a new property not known before*, and which property has been created by the patentee. This patented property consists of new and useful ideas carried out in a practical form. It never existed before; it never was public property; hence the granting of a patent takes away no man's right, and alienates no man's goods and chattels. The object of the patent law in granting a patent, is to encourage invention for the benefit of the public, and not simply individuals such as patentees. A patent, therefore, is not a monopoly in the odious sense of the term. It is simply a contract between the people (through the government their servant) and an inventor, the conditions being that the latter shall have the exclusive use of a new species of property which is his own, and which he himself created, for fourteen, seventeen, or any other term of years agreed upon, and that after this term has expired this property shall be given to the public to be freely used by all and for all time. This contract, we assert, should not be called a monopoly according to the very common meaning of the term.

A patent being a guarantee of protection in the exclusive enjoyment for a few years of rightful property, in return for which protection the patentee gives up this property to the public at the end of the term for which the patent was granted, the benefactor in this case is the inventor; and stupid must that man be who thinks that patents confer any favor or benefits upon patentees which do not rightfully belong to them. The public should know that a patent for an invention is not a favored monopoly, and that the public is the benefited party in the contract embraced in a patent.

Out, therefore, on such muddle-headed philosophers as Sir William Armstrong and his co-adjutors in their attempt to mislead the public mind on this important subject.

OUR WORKSHOPS AND THE WAR.

One of the leading papers of this city takes the ground that the war is not supported by the people, but by the government; the money which the people pay out coming back again into their own pockets. This is a somewhat common notion, but it is simple nonsense. A man who has laid up $100 and invested it in Treasury notes, will not, through any operations of the government, have that $100 to buy another $100 Treasury note with. If some government contractor makes a profit beyond his own expenses that he wishes to invest, then that *profit* is ready to be loaned again to the government. Or if an officer with high pay saves a portion of his salary, and chooses to invest it in government funds, then that portion of the first loan will be ready to be reinvested in the second loan. Traders, too, who are selling supplies to the army may invest a portion of their profits in subsequent loans. In short, the only portion of one loan to government that will be invested in a second loan is a part of the profits made by individuals out of the operations of the war. This is a very small fraction of the whole sum expended in the military operations.

Where, then, is the money to come from to carry on the war? It is to come from the profits of our industrial operations — agricultural, manufacturing, commercial, &c. There are considerable numbers of persons in the community who are even now in receipt of large incomes, either from their business or from their investments, and it is mainly from the surplus of these revenues that loans to the government will be made. There is a good deal of derangement in many kinds of business, but if we examine the matter thoroughly we shall be surprised to find how small the proportion of the derangement is compared with the whole extent of our industrial operations. The unprecedented quantities of wheat, corn, pork, beef, &c., that are loading our canals and railroads show conclusively that our largest interest—the agricultural—is moving right on in its accustomed course. Our sawmills are turning out lumber as usual, and many of our manufactories are as busy as ever; the woolen, especially, is more prosperous than ever before. Even the cotton mills are generally running, and those manufacturers who bought large stocks of cotton before the rise, are just at the present time making immense profits.

Trade is more badly deranged than any other department of business, but this is principally owing to the general refusal of those holding goods to sell on the usual time. Trade is disturbed by one of those panics that occur periodically, and that are inherent in the credit system. But even the trade of the country is not destroyed. The foreign and domestic commerce of this nation at this time is larger than was ever carried on by any country in the world before the present century.

The derangement of business is mainly temporary, owing to industry being thrown out of its accustomed channels, and especially to the complete suspension of the credit system in trade. It requires an accumulation of capital in new hands, a saving on the part of consumers and country dealers, for the same amount of trade to be done on cash as was formerly done on six and eight months' credit. But as soon as our industry can settle itself in its new channels it will resume its wonted flow, and with scarcely perceptible diminution in consequence of the war.

The power of a nation to produce wealth is in proportion to the quality and quantity of the tools which it has to work with; its steam engines, water wheels, machinery, sawmills, gristmills, ships, horses, oxen, railroads, canals, &c., and the Northern States of this Union have more of these than any other nation excepting England, and far more than England had at the beginning of the present century, when she waged her twenty years' wars with Napoleon. At that time she had just begun to build her steam engines and her cotton and woolen machinery, and even her commerce, agriculture and mining were very small compared with those of this country at the present time.

Our power of creating wealth is such that we could easily carry on two or three wars like the present. A million dollars a day is but five cents apiece for our people. But in order to reap the benefit of this great productive power, we must keep it in operation. Let, then, our manufacturers and masters of industry arrange their operations as speedily as possible in accordance with the actual condition of affairs, and let all of our machinery resume its accustomed hum. Trade is adjusting itself with surprising rapidity to the cash and short time system. The largest dealer in this city says that he has sold more goods this year than he did last. If manufacturers produce almost any article of value it is very sure to be wanted. If our workshops are only put in operation, they will enable the nation to support the war.

A NEW MODE OF LOCOMOTION.

On another page will be found an illustration of the enlarged pneumatic tube for the transmission of packages recently tried in London with a length of one-quarter of a mile, and for the introduction of which into practical use in the British metropolis a company has been organized and a grant obtained.

We have watched the growth of this enterprise with much interest, anticipating the *possibility* of its developing into a practical mode of traveling which would surpass the railroad as much in speed as the latter surpasses the fleetness of horses. For several years a Pneumatic Dispatch Company has been in operation in London, pipes of a few inches in diameter being laid, through which small parcels were sent to various parts of the city. The company, finding the system to work well, have decided to enlarge the tubes to a hight of two feet nine inches and to a width of two feet six inches, and ultimately extend their system throughout the whole metropolis. Trucks six or seven feet long are sent through these tubes with loads of one or two tuns. But the most interesting incident is, that *two gentlemen have already ridden through the tube on one of the trucks*, thus perhaps inaugurating a new system of passenger traffic.

The speed attained in the experimental trial was only about twenty-five miles an hour; but as this includes the starting and stopping in the short space of a quarter of a mile, the company anticipate a speed ultimately of 30 or 40 miles an hour. By forcing air into one end of the tube and drawing it out at the other this speed may be multiplied several fold. More than twenty-five years ago, from some calculations that we made in regard to this mode of travel, we came to the conclusion that a velocity might be reached of four miles per minute, or 240 miles per hour. For this great speed it would be necessary to lay the pipes in straight lines horizontally, though vertical undulations would be admissible; the pipes might indeed pass over very high and steep hills, so that little, if any, grading would be required.

The manifest objections to the system are:—

First, The darkness in which the passenger travels.

Second, The impossibility of having turnouts or way stations; though perhaps this objection might be overcome by some device.

Its advantages are very numerous.

First, The pipes could be brought into the very heart of a city. It takes passengers as long to come from Twenty-seventh street to the Astor House as it does to travel to the city from a distance of twenty miles; but with the pipes the passengers would be shot at full speed into the middle of the city.

Second, Each passenger would travel in his own car, and could start at any minute of the day or night.

Third, It would be the safest of all modes of travel yet devised.

If some plan could be invented for providing frequent turnouts, the system would supersede, to some extent, the use of street railroads. It would be especially suitable for the accommodation of citizens residing in suburban villages five, ten, twenty, or fifty miles away. If it took but ten minutes to travel forty miles, and there was no delay in changing cars at the suburbs, no man would need to pay a high rent for a dwelling house.

It is possible that the best plan for introducing the system would be to connect it with a speculation in lots at the outer terminus of the pipes. Buy farms and lay them out in lots to be sold at village prices, and lay the pipes for swift intercourse with the city.

If this system *should* develope into a practicable mode of traveling with the speed suggested, it would effect a very important revolution. A man might leave New York at ten o'clock at night, and after eight hours' sleep, find himself in New Orleans at six o'clock the next morning. It would take but one hour to go from this city to Washington, or to Boston, and but eleven or twelve hours to go to California! The difficulties are merely mechanical. Will they be conquered by the genius of our inventors?

Lubricating Grease.

Two patents have lately been taken out in England for lubricating compounds, the one by C. N. Leroy, of Paris, and the other by F. W. Perrott, of London. The first consists of tallow 252 parts; oil 333 parts; soda 14 parts; potash 12 parts; water 389 parts. The potash and soda are first dissolved in the water and the grease and oil are then mixed and kneaded with it and form the lubricating grease. About 25 parts of black lead added to it render it well adapted for the axles of carts and carriages.

Perrott's grease is of a more complicated character. Micaceous ore, after it is dug out, is put into a vessel of water and stirred up, then it is made to descend an inclined plane at the foot of which is placed a sieve situated over a vessel. The ore which passes through the sieve is then dried and afterward boiled and stirred with oil, or tallow and oil combined, at the rate of three parts of ore to one of oil. The whole is then passed off into a cooler and is fit for use.

A Substitute for Lead Pipe.—It is a well substantiated fact that lead pipe, when used for conducting water for drinking and culinary purposes, is highly deleterious to health.

It has therefore been for many years a desideratum with scientific men to procure an article which should obviate this difficulty. One of the best, and a successful invention for this purpose, is an article patented by Charles McBurney, Esq., and manufactured by the Boston Belting Company. A specimen of this pipe, that has been in constant use and buried under ground for three years, shows no symptom of decay. Extreme degrees of heat and cold do not affect it; water may remain frozen in it for any length of time without injury to it, and it can only be destroyed by the direct application of fire.

There is nothing injurious in any of the material of which it is composed; indeed, it could be eaten without in the least affecting the system. It is made of any size, and furnished at a remarkably low rate, and possessing so many desirable qualities, is certainly a pipe that commends itself and must come into very general use.

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PHILADELPHIA MANUFACTURES.

Philadelphia surpasses all the cities in our country for the variety of its manufactures, and for the extent and excellence of some particular branches. A complete census of its manufactures has engaged the attention of the Philadelphia Board of Trade for several years past, and they have lately presented a laborious and able report on the subject. The labor entailed in obtaining information to make up this report must have been very arduous. More than six thousand different establishments have been visited and the returns from them classified and condensed.

The following table will convey a comprehensive and intelligent idea of the manufacturing greatness of the "Quaker City:"

	No. of Establishments.	Capital invested.	Value of raw materials.	Value of products.
In the city,.....	6,314	$73,087,852	$72,333,805	$141,048,658
In the vicinity of city,				
Cotton & woolen goods,	106	5,038,040	3,226,869	6,777,349
Iron & manufactures,	34	3,044,610	1,663,003	3,888,151
Paper,.....	13	438,000	250,000	641,160
	6,467	$81,608,502	$77,473,677	$152,355,318

Total number of persons employed,..... 107,931
Total number of establishments,..... 6,467
Average production of each person,.....$1,411 60
Average production of each establishment,.....$23,558 88

The capital here mentioned does not include the value of the buildings and the ground on which they stand.

It will be interesting to all our mechanical and manufacturing readers to know something more about the different branches of these classes of manufactures.

Those relating to iron and steel embrace 649 establishments, with invested capital amounting to $10,290,125; and productions valued at $14,775,213. Manufactures part iron and steel, 190 establishments; capital, $1,961,050; value of product, $2,930,733.

In clothing and apparel there are 1,523 establishments employed; capital invested, $9,682,692; producing manufactured articles valued at $21,415,701. Including hosiery, shawls and silk wearing apparel, the production amounts to $23,758,546.

Gold and silver ware, 139 establishments, producing $4,030,380 in value; manufactures of wood, 592 establishments, producing $6,153,710; clay, sand and earth, 76 establishments, producing $2,465,106; paper, 57 establishments, value of product $2,190,110; printing, publishing, &c., 206 establishments, producing $6,441,403. There are thirty newspaper establishments included in this enumeration, employing a capital of nearly a million of dollars, and producing in value nearly two million of dollars. Products of distillation, 116 establishments, value of products, $4,384,974; leather and its manufactures, exclusive of boots and shoes, 104 establishments, value of products $5,028,562; soaps, candles and oils, 78 establishments, value of products, $4,261,916; chemicals, 44 establishments, value of product $3,685,554, with about $2,250,000 in products associated with chemicals.

The surplus product of Philadelphia, sent out of the city annually and distributed all over the land, amounts in value to one hundred million of dollars.

The proximity of Philadelphia to the great coal fields, and the abundant supply of cheap fuel which her manufacturers can obtain, confer upon them great advantages.

Extraordinary Prosperity of our Railroads.

The following table gives the earnings for 1861, compared with the corresponding period of 1860, of all the railroad companies of the country in the practice of publishing monthly reports. It will be seen that there has been, notwithstanding the war, a very large increase in the receipts:

Roads.	1860.	1861.	*Increas.*
New York Central, 10 mos.....	$6,698,252	6,614,298	516,046
New York and Erie, 10 mos.....	4,583,975	5,091,403	508,428
Hudson River. 11 mos.....	1,570,784	1,843,263	*27,521
Cleveland and Toledo, 5 mos.....	353,071	372,492	19,421
Michigan Central, 8 mos.....	954,499	992,895	38,396
Galena and Chicago, 8 mos.....	743,597	992,842	249,245
Chicago and Rock Island, 8 mos.....	722,423	668,688	54,335
Chicago, Burlington & Quincy, 6 mos.	931,736	838,655	*93,081
Illinois Central, 8 mos.....	1,615,786	1,845,397	229,610
Milwaukee & Prairie du Chien, 8 mos.	360,660	646,847	286,187
Milwaukee and La Crosse, 7 mos.....	320,184	524,752	204,568
Toledo, Wabash and Western, 8 mos.	566,705	627,540	60,839
Chicago, Atlantic & St. Louis, 8 mos..	597,267	635,045	37,778
Pittsburgh, Ft. Wayne & Chi'g, 8 mos.	1,176,329	1,554,812	378,484
Philadelphia and Reading, 8 mos.....	1,951,971	1,844,060	*107,911
Chicago and Northwestern, 5 mos.....	230,482	333,132	102,650
Harlem, 8 mos.....	764,546	741,364	*23,184
Erie Canal, 5 mos.....	2,381,301	3,366,822	985,951
Totals.....	$26,842,568	29,543,707	2,701,139

*Decrease.

The London *Evening Mail* recently made the very sound remark, that there is no better index of the general prosperity of a community than the condition of its railroads. The business of these depends upon the activity of all other business, and hence they furnish the best measure that there is of the *aggregate* condition of a nation's industry. Tried by this most reliable test, it seems that our people are not only able to support the great war which they have upon their hands, but at the same time enlarge the sphere and increase the products of their peaceful operations.

Taxation in Europe and America.

The annual expenditure of Great Britain is £70,000,000 ($330,000,000); that of France 1,800,000,000 francs ($340,000,000); the United States $80,000,000. About £28,000,000 is expended annually in England as interest on the national debt. France has a population of 35,781,000; Great Britain, Ireland and the Isles a population of 29,000,000; the United States a population of 31,429,000. The tax in France per annum is about ten dollars per head; in England twelve; in the United States it is not quite three dollars. The expenses of the several state governments, however, are not included in the above; these are considerable; no such expenses are incurred in France or England, still the entire amount of American taxation cannot exceed one half of that imposed on the subjects of Great Britain. The great fleets and armies of England, and the vast extent of possessions to be protected, also the interest of the national debt to be paid, would lead us to conclude that the revenues of that kingdom were very economically applied as a whole, although in particular cases, they are sometimes lavished in such a manner as would make our citizens perfectly rabid, if the same were done in this republic. It takes about five million of dollars yearly to support the royal family, and large pensions are paid to several foreign princes and princesses.

New Iron-Clad Gunboats.

It is stated that the Navy Department has accepted proposals for the building of three iron-clad war vessels. The parties whose proposals have been accepted have heretofore not been distinguished for executing works of this character, yet their plans may be good, and they may obtain contractors who will carry out their designs faithfully.

The New York *Herald* of the 22d inst. contains an account of a new iron-clad gunboat now being built at Mystic, Conn., of the moderate capacity of 1,000 tuns, which it states will be "a credit to us as a nation," and that it "will far surpass in power of resistance anything our transatlantic friends have at the present time and possibly anything hereafter." It then describes a small, strong, timber-framed vessel, but is oblivious of the iron casing by which it is to surpass *La Gloire*, the *Black Prince* and other huge mail-clad frigates in the French and British navies. All steam vessels of war are furnished with screw propellers, because they admit of placing the machinery under the waterline, where it is protected from shot. The screw exerts a peculiar shaking action upon the framing of a vessel, tending to open her seams. In practice, iron frames are the most suitable for propellers, on account of their great strength and durability.

The British Mercantile Steam Fleet.

The steam fleet of Great Britain has contributed incalculably to her pre-eminence as a commercial nation. Indeed, few have any adequate conception of the rapid growth of this important interest, or the extent already attained. It appears from an official return that at the commencement of the present year 1,945 steamers were registered in the United Kingdom, of a gross burthen of 686,417 tuns, being an increase of 82 vessels and 19,904 tuns, as compared with the corresponding date of 1860. The number of paddle steamers was 1,342; of screws 601. As regards the materials of which they were constructed, 601 were built of wood, 1,080 of iron, and five of steel. Of the whole number of steamships 515 are owned in London. The scale of operations entered upon by some of the leading steamship companies of England is enormous. First, in importance as concerns the United States, is the "Cunard fleet," owned principally in Glasgow, comprising no less than thirty large steamers, averaging not far from 2,000 tons. The largest of these is the new steamer *Scotia*, which measures 4,000 tuns.

ENGLISH SHIPBUILDERS STILL FOLLOWING STEVENS'S FLOATING BATTERY.

The English government has just ordered the construction of three more iron-plated frigates, to be larger than any heretofore built. They are to be 400 feet long, 59 feet 4 inches wide and 21 feet deep, and are to measure 6,815 tuns. *They will have bows beneath the water projecting far in advance of the apparent bows above.*

It will be remembered that this is one of the most novel features in Stevens's floating battery. Since the first iron-plated gunboat each iron-plated vessel built in England or France has been brought a step nearer the bold and original conception formed in the mind of Edwin A. Stevens more than 20 years ago. The three vessels now being built in England come very near being exact counterparts of the Stevens floating battery. They are to cost $2,500,000 apiece.

Operations of the U. S. Assay Office, New York, for the Year 1860–1861.

The following interesting statistics are taken from the *Merchants' Magazine*:—

	Bullion Deposits.		Silver parted from Gold		Bars.
	Gold.	*Silver.*	*For Depositors.*	*Office. For Assays*	*Returned for Coins.*
1860.					
1st quar.,	$3,816,775 86	$ 93,473 99	$29,652 99	$155 82	$155,125 63
2d "	608,953 51	114,878 17	6,384 62	35 51	115,612 78
3d "	697,936 59	111,338 90	8,392 99	45 10	.....
4th "	11,818,605 61	216,471 84	62,877 75	89 39	42,782 80
	*$16,942,271 57	$536,162 90	$107,308 35	$325 82	$313,521 21
1861.					
1st quar.	*$17,882,426 72	$452,118 14	$70,275 05	$322 29	.....

	Fine gold bars.	Fine bars made by melter and refiner.		Bullion sent to the Mint for coinage.	
1860.	*Paid Depositors.*	*Gold.*	*Silver.*	*Gold.*	*Silver.*
1st quar.,	$696,085 31	$4,195,423 32	$32,602 27	$2,746,002 25	$68,569 09
2d "	437,209 54	678,760 78	67,504 24	222,479 50	77,694 38
3d "	519,755 38	636,713 13	37,854 35	113,541 47	29,945 50
4th "	318,871 44	5,765,521 57	115,781 02	8,772,811 30	101,987 64
	$1,971,921 67	$11,276,418 80	$253,741 88	$11,854,83452	$278,19661
1861.					
1st quar.,	$169,093 65	$8,376,174 74	$50,317 62	$19,484,60306	$496,82985

*15,150,000 of the above gold deposits, in foreign coins, such as sovereigns, napoleons, thalers, &c.

Montreal.

The British provinces of North America seem to be progressing rapidly in population and wealth. The two Canadas now contain a population of three and a half millions, and the Grand Trunk Railroad is a national highway which is doing much to increase commerce and attract emigration. The city of Montreal, which is so favorably situated in the St. Lawrence river, has recently greatly increased in commerce. The *Gazette* of that city states that vessels of 136,782 tunnage had arrived at that port this year up to August 1st. Of wheat there arrived 3,611,434 bushels; corn 134,196 and peas 1,286,693. This is more than double the quantity which arrived in the same period in 1860.

The Philadelphia Navy Yard.

The following interesting account of the above yard is condensed from the Philadelphia *Ledger*:—

The Philadelphia Navy Yard, which at the present time is thronged with workmen for the purpose of building and repairing vessels to be used in putting down the present rebellion in a number of the Southern States, did not assume much importance until 1804, though previous to this date the United States frigate *United States* had been built. Since the permanent establishment of the yard, a great number of vessels have been built, and most of them have not only been the pride of their commanders but of the nation.

The following are the names and classes of vessels built at this yards:—Ships-of-the-line—*Pennsylvania* and *North Carolina*; frigates—*United States* and *Raritan*; sloops-of-war—*Germantown*, *Vandalia* and *Dale*; store vessels—the *Relief* and *Princeton*; screw frigate—the *Wabash*; first class steam sloops, screw—*Lancaster*; side wheel—*Mississippi* and *Susquehannah*; second class steam sloops, screw—*Pawnee*, *Wyoming* and *Tuscarora*. There are now building the *Juniata* and a side wheel steamer, which has not yet been named.

THE Worcester (Mass.,) *Spy* states that the signs of business prosperity in that city are full of promise. It says:—"The owners of machine shops and manufacturers, with a few exceptions, are doing a fair business, and are confident of improving times. In the northern part of the county the chair factories, the large machine shops, the paper mills and nearly all the branches of productive industry are in full operation—some upon government contracts, others upon their usual custom work."

THE Lowell *Journal* states that the Middlesex mills are very busy, and that the demand for shawls is greater than can at present be supplied in ordinary running hours.

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Important to Parents and Teachers.

We respectfully but very earnestly call the attention of our readers to the statements below. It will be seen that it is proved by a very extensive collection of facts that children learn more when they study three hours a day than they do when they study six. We have long been convinced of this from our own experience and observation, and we believe that no more momentous truth can be disseminated among the community.

When a child comes in fresh from his play, with the blood bounding through his veins, his brain is full of life and vigor, his ideas are all clear, and he can learn more in fifteen minutes than he can in two hours after his brain is fatigued and his whole system has become languid by confinement at his desk.

From pretty extensive inquiry we are satisfied that the present murderous system of long confinement in school is continued by a want of frankness between parents and teachers. Nearly all the parents are opposed to the practice, but it is kept up by the teachers under the mistaken idea that they will give dissatisfaction by reducing the hours of their own labor.

Not only should the gross amount of study be greatly diminished, but recesses should be more frequent. Thirty minutes is quite long enough for any young child to study, and one hour for a child of any age. The human brain is not like a steam engine that the longer you run it, the more work you get out of it. What the brain can do depends wholly upon its condition. Any person can accomplish more mental labor in one hour when the brain is in a healthy and active state, than he can perform in a month when the brain is tired and exhausted.

Among the Parliamentary papers recently issued in England, are two small volumes containing some information collected by Mr. Edwin Chadwick during the recent education inquiry. Mr. Chadwick shows in these papers that the present practice of long hours of teaching is a wide cause of enervation and predisposition to disease, and induces also habits of listlessness and dawdling. The half-time system is found to give nearly, if not quite, as good education as the whole time; and common sense tells us that a boy who has acquired the same amount of knowledge in half the time of another boy must have obtained a proportionately superior habit of mental activity. It is this alertness, combined with the bodily aptitudes created by drill, that gives the comparatively stunted boys of the town a preference over the strong robust lads from the coast. Good schoolmasters say that about three hours a day are as long as a bright, voluntary attention on the part of children can be secured, and that in that period they may really be taught as much as they can receive; all beyond the profitable limit is waste. Hence it is urged that part of the present long school hours be devoted to gymnastic exercises or drill, as part of the system of education, or that the half-time system be more adopted. It is a frequent complaint by runaway apprentices and vagrant children that the work to which they were first put was really very painful to them; but children, while at school, might be gradually introduced and accustomed to labor and exertion. Early physical training would remove or diminish congenital defects or bodily weakness. It is estimated that an addition of at least a fifth might be made to the efficiency and value of a boy as a laborer in after life—an addition equivalent, in the mass, to the produce of the labor of one-fifth more of population, without the expense of additional food, clothes or shelter, to maintain them. Drill is very strongly recommended by many eminent men, who give their testimony in these papers. It improves the health, the carriage, the manners, even the character; sharpens the attention, gives habits of obedience, promptness, regularity and self-restraint. Sir F. B. Head writes:—"No animal, whether on four legs or two, can be of any use in the workshop of man until he has been sufficiently divested of that portion of his natural inheritance called a 'will of his own.' What's the use of a cow if she won't allow either man or maid to milk her?—what's the use of a horse if he won't put his head into a collar or suffer a saddle on his back? A system of military drill in our schools would prove so beneficial that, if once adopted, an undrilled young man, like a raw, unbroken horse, would be considered unserviceable." "I should consider a youth of double value," says Mr. Whitworth, "who has had the training of the nature of a drill; he attends to commands; he keeps everything he has to do with in a high state of cleanliness; defects are corrected, and special qualifications brought out." "We find the drilled men very superior," says Mr. Fairbairn. "They are constantly in readiness for the protection of the country," writes Lieutenant General Shaw Kennedy. "I would not," said an eminent manufacturer, "take less than £7,000 for my whole set of workmen in exchange for the uneducated, ill-trained and ill-conditioned workmen of the manufacturer opposite. The steadiness of the educated men induces steadiness of work, and comparative certainty in the quality and quantity of the produce." "Why do you bespeak children from the infant school in preference to others?" an operative was asked: "Because they require less beating, and they are sooner taught," was the expressive answer. It is maintained in the papers that much more might be made of the existing means of education by a system of union and consolidation and gradation of schools, and a division of educational labor; and with improvements of this nature, and contemplating the striking results of education in the district half-time industrial schools for paupers—schools which are emancipating children from hereditary pauperism and crime by methods of training which might be so much more widely adopted—"men like us, past the middle period of life," writes Mr. Chadwick, "might expect to see in a few years a change in the whole moral and intellectual condition of the population, as great as any change produced by improvements in physical science and art in our time."

The Shoe Market.

The *Shoe and Leather Reporter* states that the Boston shoe market has assumed a very lively appearance, which contrasts very pleasantly with the despondency which prevailed for previous months. It says:—

The principal call is and has been for oak or hemlock brogans for the army, the demand for goods for ladies' wear or light shoes for the other sex being very limited. There is some call for boots and heavy goods for the California market; the ship *Electric Spark*, which recently cleared for San Francisco, took out 1,243 cases.

The stock of prime goods is very small, and there seems little danger of many shoes being left over to next season, as scarcely anything is being made up except on orders. Sales are also made very generally on a cash basis.

THE ELECTRIC TELEGRAPH.—We have before us a recently published work, entitled "The Triumphs of Invention and Discoveries," from the press of Thomas Nelson & Son, London. We have examined it with some care, and although a superficial and comparatively unimportant work, yet it has all the profound conceit that generally exists amongst British writers. In the article on the Electric Telegraph, the entire credit of this great invention is placidly bestowed upon the British, Morse's name nowhere appearing in the work. The author, in the face of all the facts to the contrary, does not scruple coolly to rob our countryman of all credit in the production of this great work.

SCIENTIFIC COMPLIMENT.—At a meeting of the Academy of Sciences of the French Imperial Institute, last month, our distinguished countryman, Professor Alexander Dallas Bache, Superintendent of the American Coast Survey, was elected a Foreign Corresponding Member of the Academy.

THE first railroad in Oregon has just been built on what is called the "the transit across the cascades." The road is of substantial construction, is three and three-quarters of a mile long, and most of it is on tressel-work of a dizzy hight.

A BATTERY of Whitworth's rifled cannon, presented by the loyal American citizens in England to our government, was forwarded from this city to Washington on the 17th ult. They were fitted with carriages, caissons, wagons and forge of the United States pattern.

A new steel-pen factory has been established in Camden, N. J., by R. Esterbrook & Co., who, having secured the services of some of the best pen makers of the old world, and one of the firm having twenty years' experience in the business, expect to manufacture an improved and superior article. It is supposed that Birmingham will be obliged to yield the "champion quill" to Jersey.

Hardening the Surfaces of Rails and Railway Wheels.

A patent has lately been taken out by Mr. Wm. Longmaid, of Ireland, for hardening the surfaces of rails and tyres of wheels, after they are formed in the usual manner, by subjecting them to a peculiar process. The rails and tyres are packed in a suitable iron chamber with peat or wood sawdust, previously saturated with sulphuric acid, covering the surface to be hardened. The chamber is then closed so as to exclude the air, and with its contents is raised to a red heat by a fire, and maintained at this temperature for thirty-six or forty hours. The bars and tyres are then withdrawn from the chamber and tempered by any of the well-known processes, and they are fit for use.

CHARRING RAILWAY TIMBER.—The same inventor chars the surfaces of railway timbers, by saturating them first with dilute sulphuric acid, then heating them in an oven raised to a temperature of 250° Fah. The strength of acid prefered is about 3° Twaddles' hydrometer. Railway timbers when charred on the surface endure much longer than if exposed with their natural surfaces. This is certainly a peculiar way of charring the surface of wood at such a low temperature. We should have judged that the sulphuric acid would have injured the timber, but Mr. Longmaid says it does not.

NEW YORK MARKETS.

COAL.—Anthracite is selling at the yards from $4 50 to $5 per 2,000 lbs (short tun).

COFFEE.—There is an active demand for Rio coffee, and a buoyant feeling in the market. The duty on coffee is 4c. per lb. when shipped in American vessels from the place where it is grown; all other vessels except the Dutch, 10 per cent *ad valorum* in addition. The prices of coffee range from 14c. for St. Domingo, the lowest, to 20c. per lb, for Java, the highest.

COPPER.—American ingot copper ranges from 19¾c. to 20. per lb.—rather low. The sales are small.

COTTON.—The market is inactive, and prices may be considered nominal. The reported sales are 1,000 for the week ending September 19th. We quote:—

	Upland.	*Florida.*	*Mobile.*	*N. Orleans & Texas.*
Ordinary, per lb	18	18	18	18
Good ordinary	19¼	19¼	19¼	19½
Middling	21½	21¾	21¾	22
Good middling	22	22¼	22½	23
Middling fair	—	—	—	—
Fair	—	—	—	—

The arrivals have been—

From Providence, bales ..... *i.* 405

Total import since September 1st 1,647

The export from the 1st to the 17th was 6 bales; same period of 1860 4,548 bales. The export of cotton from New York has therefore ceased

FLOUR.—The demand for State and Western flour has been active during the past week, and prices have advanced from 15c. to 30c. per bbl. The prices range from $4 80 to $6 25 per bbl. The export from New York from the 1st to the 17th of September was 88,481 bbls.

GRAIN.—The wheat market has been greatly inspirited by the news from Europe relative to a partial failure of crops in France, Germany and Great Britain. From English papers we learn that the quality of the wheat is good, but the quantity to the acre is small; there will therefore be a large European demand for American grain this fall and winter. The sales during the four days of the past week were fickle, and amounted to 670,000 bushels. The receipts were light, and holders not inclined to sell, expecting higher rates soon. The prices range from $1 16 to $1 40 per bushel,

HIDES.—The prices of hides regulate the price of leather, which is one of our important and staple articles. The demand for hides is active, and prices have materially advanced. The total imports since the 1st of September are 485,400, against 235,100 for the same period in 1860. With such a large import and great activity in the market, the tanning business promises to be better than it has been for three years past.

INDIGO.—There is a great demand for the finer qualities of this dye drug. The best Bengal in chest is $1 85 per lb.; Manilla, from 60c. to 90c.

IRON.—Foreign pig is firm, with small sales. American pig is in better demand, with a slightly upward tendency in prices, ranging from $15 50 to $17 50 per tun. Such prices are still held as being too low to be remunerative, and holders are not willing to sell.

LEAD.—Pig continues in good request at full prices. The American stock is small. Bar is quoted at 6½c. per lb.; Pipe at 6½c.

LUMBER.—There is a very limited demand for lumber, owing to the prostration of the housebuilding business. White pine, Albany boards (tongued and grooved), $20 to $22 per M. feet; Spruce boards, from $13 to $15 per M. feet.

PROVISIONS.—Mess beef, country, from $5 to $5 50 per bbl.; Extra beef, $12 to $18; Western pork, $10 to $15 50; Prime mess, $17 to $18.

STEEL.—English, from 14c. to 16c. per lb.; German, 7c. to 10c. American spring steel, 5c. to 5½c.

SUGAR.—Duty on all raw, 2c. per lb.; slightly improved beyond th raw, 2½c.; refined, 4c. Ranges from 4c. to 10⅝c. per lb. The prices have advanced, as there is a diminished stock on hand.

TALLOW.—This article is scarce, and there is a considerable demand for it for export; price, 8¾c. per lb., cash.

TEA.—The duty on tea is 15c. per lb. The quantity of tea in the market is said to be small. The prices range over an extensive variety, from common Singapore, at 18c. per lb., to the finest Fychou, at 75c. per lb.

TIN.—The best Banca ranges from 27c. to 28c. per lb. Tin plate is in good demand, and brings prices ranging from $5 75 to $8 25 per box.

TOBACCO.—The duty on leaf is 25 and on other unmanufactured 30 per cent *ad valorum*. Ohio seed leaf ranges from 5c. to 17c. per lb.; Havana fillers and wrappers, from 28c. to $1; Connecticut fillers and wrappers, from 5c. to 20c.

WOOL.—American Saxony fleece, from 35c. to 38c. per lb.; Merino, 30c. to 35c.; Foreign, from 8c. to 27c. There is a great demand for coarse wool which has advanced in price.

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SSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING SEPTEMBER 17, 1861.

Reported Officially for the Scientific American.

PATENTEES, READ THIS.

The new Patent Laws which went into force on the 2d of March last, authorized the Commissioner of Patents to have all the specifications which form part of the Letters Patent printed.

This is a wise provision, and it renders the documents much handsomer than the old system of engrossing them on parchment; besides, in passing before the printer and proof-reader, the clerical errors, which were often made by the copyist, are mostly obviated, thus rendering the patent more likely to be correct.

But to afford the printer and proof-reader an opportunity to do their work properly, the Patent Office is obliged to withhold the Letters Patent after granting them, for about *four weeks* after the claims are published in the SCIENTIFIC AMERICAN.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 4, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

2,281.—Nathan Ames, of Saugus Center, Mass., for Improved Combination of Knife, Fork and Spoon:

I claim constructing a knife blade with a spoon, fork, or forked spoon, C, projecting above or beyond the general line or curve of the back of the knife, and at any desirable angle with the edge, substantially as and for the purposes described.

2,282.—Abel Ashold, of Garrettsville, Ohio, for Improved Camp Stool:

I claim the seat, A, pivots, a d, legs, B D, slots, e e, and screws, b, combined, arranged and operating in the manner described.

[The subject of this invention is a camp stool which, by a very simple adjustment, can be contracted into a very good head rest or pillow for a person lying down, and can also be folded up into a very compact and convenient form for carrying about in the hand.]

2,283.—G. R. Barker, of Germantown, Pa., for Improvement in Brakes for Horse Cars:

I claim, first, The combination and arrangement of the operating bar, G, with its arms, F F, and bridle, E E, the double clutch, C D D′, on the axle, the chains, P″ P‴, the sliding block, L, spring, H, the rack, M, and pawl, N′, the operating bar, S′, with its foot lever, S, and arm, S″, the chains, P P′ and pulleys, O O′, the same being constructed and applied to operate together, substantially in the manner described and for the purpose set forth,

Second, I claim the described arrangement of the adjustable pulleys, R R′, and ropes, R″ R‴, in combination with the clutch cylinders, D D′, as described and for the purposes set forth.

Third, I also claim the arrangement of the conical block, T′, or its equivalent, so as to operate, in combination with the block, L, upon the arm, U, substantially in the manner described, and for the purpose specified.

2,284.—L. A. Beardsley, of South Edmeston, N. Y., for Improvement in Hay-elevating Forks:

I claim the connecting of the lower end of the lever, E, with the latch, G, by means of a spring, F, substantially as shown, making the same self-adjusting, and preventing the casual detachment of the latch from the lever, as described.

[This invention relates to an improvement on a hay-elevating fork, the object of which is to render the fork more steady in its upward movement than formerly, and effectually prevent the turning of the implement and casual disengagement of its tines when in a suspended state, a contingency which would occasionally occur in using the previously patented device.]

2,285.—O. P. Beardsley, of McDonough, N. Y., for Improvement in Process of Refining Maple Sugar:

I claim the mode described of extracting the magnesia and its adherent impurities by straining it through a thick cloth after or where the sugar has been so far concentrated as to cause the magnesia to granulate or assume a distinct form in which it can be thus removed.

2,286.—Noah Bennett, of Sherman, N. Y., for Improvement in Butter Workers:

I claim the combined arrangement of the dish, E, with handles, h h, or their equivalents, and the pinion, G, adjustable on the shaft of the fluted roller, D, so that the butter may, at intervals, be readily gathered together for renewed working, substantially as specified.

In combination with the above, I also claim the hinged segment guard, H, arranged and operating as set forth.

I also claim the combination of the central standard pivot, B, outlets, e e, and annular trough, m, close around said pivot, substantially as and for the purpose specified.

2,287.—H. A. Billings, of Providence, R. I., for Power-Molding Machine:

I claim the combination of the endless traveler, B B, the sieve, C V, or their equivalents, with one or more compressing cylinders, D or E, such combination operating substantially as described for the purposes specified.

2,288.—J. B. Blanchard, of Sacramento, Cal., for Improvement in Anti-Friction Boxes for Carriage Wheels:

I claim securing the rollers, B, in the box, A, by means of the cap, C, screwed on the outer end of the box, A, and provided with the ledge or shoulder, f, and recess, g, in connection with the ledge or shoulder, b, at the inner or back end of the box, A, and the annular plates, d h, and screw rods, D, substantially as described.

[This invention relates to an improvement in what are generally known as anti-friction boxes for carriage wheels, and which are formed by placing rollers within the box in the form of hollow cylinders, and within which the arm of the axle is fitted.]

2,289.—A. E. Blood and J. B. Blood, of Lynn, Mass., for Improved Flour Sifter:

We claim the combination and arrangement of the cylindrical sieve with scrapers, M N O, and levers, H I, all substantially as and for the purpose set forth.

2,290.—G. M. Cole, of Folsom City, Cal., for Improvement in Mode of Turning Locomotives:

I claim the application of steam from the locomotive, in the manner described, to do the work of turning turn-tables, thereby saving a vast amount of labor and time.

I also claim, in this connection the combination of the great segment cogwheel and the track upon which the wheels of the turn-table roll, by casting the said track with the cogs on the edge of it, thereby dispensing with one heavy set of castings and fastenings.

All of which I claim substantially in the manner and for the purpose set forth.

2,291.—Wm. H. Conway, of Harrison, Md., for Improved Gaff for Vessels' Sails:

I claim, first, Dividing the gaff into two parts, called the jaws and the peak; and uniting or connecting them together by means of a hinge, whereby the chafing or abrasion of the mast is prevented and the strain upon the canvas relieved in the striking of the sail, substantially as described.

Second, In combination with a gaff so divided and hinged, making the jaws thereof out of timber, which presents a naturally formed fork or crotch, as and for the purposes described.

2,292.—A. L. Darby, of White Creek, N. Y., for Improvement in Mowing Machines:

I claim the arrangement of the cutter bar, A, in reference to the crank operating the cutters, so that the axis of the one may be in such position towards the other, that the bar may be swung over from its working position on one side of the frame, F, to a similar position on the other, and permit the crank to operate the cutters equally well on either side, substantially as set forth.

2,293.—A. B. Davis, of Philadelphia, Pa., for Improvement in Platform Scales:

I claim the levers, F F and G G, on the adjustable beams, C and C′, in combination with the diagonal levers, H H, and the adjustable frame which carries the graduated scale beam or beams, the whole being arranged substantially as and for the purpose set forth.

2,294.—John Dobbs, of Albany, N. Y., for an Improvement in Paper-Ruling Machines:

I claim, in ruling machines, where it is desired to rule lines shorter than those starting from the head of the work, the employment of thin slips of material of various lengths, depending upon the length of the lines to be ruled, the said slips being attached to and adjustable upon a movable bar, connected with the beam carrying the pens; substantially as set forth and for the purposes declared in this specification.

2,295.—Benjamin Douglas, of Middletown, Conn., for an Improvement in Pumps:

I claim a pump rest having a seat or support for the induction valve and pipe in its upper end, and a foot or support, substantially as set forth, at its lower end, and in combination therewith, I claim constructing the foot as described, so that the pump may be held in place by permanent means, or held temporarily in any desired location by the foot of the operator.

2,296.—Joseph S. Elliott, of Philadelphia, Pa., for an Improved Register for Gas Meters:

I claim the construction and arrangement described, of the concentric rings of perpendicular, cylindrical stop teeth or studs, h h, and the perpendicular gear teeth, i i, on the driven wheels, together with the recesses, k, and perpendicular driving studs, l, in the drivers, the whole operating together in the manner described and set forth, and for the purpose specified.

I also claim, in combination with the subject matter of the above claim, arranging the numeral disks, a d e f, upon the shafts of their respective wheels, A D E F, so as to operate behind the perforated front plate, G, of the frame, as described and set forth, and for the purpose specified,

2,297.—Victor Fouchier, of Paris, France, for an Improvement in Mills for Grinding Grain. Patented in England March 24, 1851.

I claim the described arrangement of principal intermediate, oblique and cutting and discharging furrows, D E, F G, J K, L M, H I and N O, of each of the angular sections arranged on the grinding surface of the mill-stone, as described.

2,298.—F. H. Furniss, of Cleveland, Ohio, for an Improvement in Railroad Car Ventilators:

I claim the fan-wheel, C, revolving the radiating arms, a, when combined with the disk, b, and water chamber, as arranged, and operating substantially as described.

I also claim the gage valve, K, and flue, H, in combination with the water chamber and revolving arms, a, and disk, b, in the manner and for the purpose set forth.

2,299.—Dennis C. Gately, of Newtown, Conn., for an Improvement in Process for Vulcanizing Caoutchouc and other Substances:

I claim the process described of curing or vulcanizing india rubber or gutta percha, the same consisting in subjecting the articles to be cured or vulcanized to the action, whether direct or otherwise, of superheated steam, substantially as set forth.

2,300.—John Gault, of Boston, Mass., for Combination of Eraser and Eraser Sharpener:

I claim the combination of an india rubber pencil eraser with a whetstone and strap, in the manner and for the purposes described.

2,301.—Moses G. Hubbard, of Syracuse, N. Y., for an Improvement in Driving Power for Spinners:

I claim supporting the end of the speeded shaft, in the stationary journal-box, H, and driving it by means of the driving rims, substantially as and for the purpose set forth.

2,302.—G. Jassath, of New York City, for an Improvement in Cartridge Box:

I claim a cartridge box formed of a box, A, provided with a series of inclined tubes, b, and fitted within an outer or external box, C, all arranged substantially as shown and described.

[The object of this invention is to construct the cartridge box in such a manner that it may be readily filled with cartridges, and the latter readily withdrawn from the box when desired for use. The invention also having for its object the stowing away or holding a greater number of cartridges than usual in a box of a given size, and also a more thorough protection of the cartridge from dampness.]

2,303.—Marcus Lane, of Washington City, D. C., for an Improvement in Shoemakers' Measures:

I claim, first, A machine for taking and determining simultaneously the measures of the foot, containing the following devices, to wit:—First, Means for taking the measure of the length of the foot; second, means for taking the various measures desired of the transverse span of the foot, and, third, means for retaining the measuring indices or devices in position, so that they shall allow the fitting of a suitable last thereto.

Second, In an organized machine for so taking the measure of the foot of a person, I claim the use of flexible, non-elastic straps or tapes as contradistinguished from such elastic limber straps or tapes as are in common use for measuring the foot.

Third, I claim the tapes, n, in combination with the clasps, O, as described, by means of which the holes in the tapes perform the double function of retaining the measure when taken at the same time they indicate the fractions of an inch of the measure.

Fourth, In an organized machine, which is capable of determining the circumferential span as well as the longitudinal measure of the foot, I claim an instep measuring tape which is capable of accommodating itself to the varying hights of insteps to be measured.

Fifth, I claim the instep measuring strap or tape, n, and slide, t, in combination with the base plate, a, by means of which the instep tape may be slid forward to permit the withdrawal of the foot, or insertion or withdrawal of the last.

2,304.—Richard Lord, of Pawtucket, Mass., for an Improvement in Air Engines:

I claim, first, The piston constructed as a fire-grate, applied to the cylinder in combination with valves, B C, or their equivalents, and operating substantially as herein specified.

Second, The combination of the hollow valve, B, and the hollow casing B′, arranged in the manner and for the purpose set forth.

[The object of this invention is to force air into a reservoir, from which it is to be used like steam from a boiler to operate an engine.]

2,305.—H. G. Ludlow, 2d, of Waterford, N. Y., for an Improvement in Sliding Stop Valves:

I claim combining the valve with its stem, by means of a wedge-plate, C, applied and operating substantially as and for the purpose specified.

[This invention relates to that kind of valve known as the "sliding stop valve," and it consists principally in so applying a wedge or wedges, in combination with such valve, as to bring the valve tight against its seat after it has completed its closing movement, but to enable the valve to work free of its seat in its opening and closing movements, and so as to prevent, entirely or in a very great degree, friction between the face of the valve and its seat, thus obviating almost entirely the wear of the face and seat, and the necessity for regrinding.]

2,306.—Wm. S. Mayo, of New York City, for an Improvement in Fence Posts:

I claim as an improved article of manufacture, a fence post made of clay in an entire piece, and afterward hardened by burning as explained.

2,307.—John M. Oakley, of New York City, for an Improvement in Washing Machines:

I claim the arrangement of the pendulous arms, B B, and attached slatted plungers, E E, with the inclined corrugated back, f, curved bottom, a, rods, C C, and double crank, C′, all as shown and described for the pursose set forth.

2,308.—S. Sargent, of Watertown, Mass., Assignor to himself and A. P. Knapp, of Needham, Mass., for an Improvement in Coal-oil Lanterns:

I claim the arrangement and combination of the device for enabling the wick to be regulated outside of the lantern, the perforations, i i, in the base flange of the lamp, D, the draught collector, u, division plates, N N, perforated regulating plate, P, and guard cylinder, R, in the manner and for the purpose specified.

2,309.—E. R. Stillwell, of Dayton, Ohio, for an Improved Machine for Shaping Lasts:

I claim the combination of the cutters, with the revolving head, when said cutters are arranged in a spiral conical form on said head, converging from the periphery of the head to the centre, substantially in the manner and applied to the purpose set forth.

2,310.—P. W. Thomas, of Levee, Ky., for an Improvement in Compositions for Tanning:

I claim the tanning solution compounded of the materials described, substantially in the proportions specified.

2,311.—Edward Brown Wilson, of Westminster, England, Assignor to William Butcher, Jr., of Sheffield, England, for an Improved Method of Annealing and Swaging Castings:

I claim the process described of treating articles composed of cast steel or malleable cast iron for the purposes set forth, by first casting the articles in suitable molds, and by then, and after having reheated them in a furnace, pressing them in dies or matrices of a shape corresponding to the exact shape and finish of the completed articles.

2,312.—Nathan Ames, of Saugus Centre, Mass., assignor to himself and J. C. Wilder, of Boston, Mass., for an Improved Strainer for Coffee and Tea Pots:

I claim, first, A removable strainer consisting of a rubber or elastic tube, R, provided with a termination, S, of wire gauze, or perforated metal, substantially as described and for the objects specified.

Second, In combination with the strainer, S, a flaring collar, D, substantially as and for the purposes described.

Third, The casing, C, in combination with the strainer, S, collar, D, and elastic tube, R, substantially as set forth and for the object specified.

2,313.—Frederick Curtis, of Newton, Mass., Assignor to Edward H. Ashcroft and John B. Alley, of Lynn, Mass., for an Improvement in Breech Loading Fire Arms:

I claim, first, Constructing the breech pin and breech carrier of a fire arm in two parts, and so connecting them together as to be enabled to introduce and withdraw the said breech pin, into and from, the bore of the barrel in the line of its axis, substantially in the manner and for the purpose described.

Second, I also claim, in combination with the breech carrier and the breech proper, when the two are jointed together as described, a spring, so arranged in relation to the said breech, as to retain it in the same position with regard to the breech carrier that it has when it leaves the barrel, so as to establish a yielding connection of the parts as set forth.

Third, I also claim the peculiar construction of the guard, D, and its relation to the catch, f, the trigger and the working parts of the gun substantially as described.

2,314.—R. B. Fitts, of Philadelphia, Pa., Assignor to himself, E. P. Thoonburgh, and Wm. Stacy, of the same place, for an Improved Feed Bag for Horses and other Animals.

I claim the holder or vessel, A, the jointed rim, B, bail, C, strap, D constructed and operating substantially as and for the purpose described.

2,315.—S. L. Foster (assignor to E. W. Thompson), of Bristol, Maine, for an Improved Rudder Case for Navigable Vessels:

I claim the combination and arrangement of the adjustable clamp, c f, their ring section, h, and friction rollers, b, applied to the upper part of the rudder case and stern post, substantially as described.

Also, the combination and arrangement of the wedged collars, d, and inclined bearing pieces, e g with the clamps and the friction rollers.

Also, the combination and arrangement of the curved wedge, I, and its grooved socket piece, H, with the stern post and rudder case.

2,316.—F. L. Howe (assignor to himself and J. H. Murdock), of Woodstock, Vt., for an Improvement in Stump Extractors:

I claim the arrangement of the forked lever, F, and chains, b b, with the pawls, E E′, lever, D, and ratchet, C, in the manner shown and described.

[This invention consists in the use of a lever provided with a central fulcrum pin and with two pawls, which are connected to an adjusting lever by chains, and which pawls, when the device is in operation, engage with the ratchet of a windlass, the above parts being placed in a suitable frame and used in connection with the usual chain and strut, whereby an implement is obtained that may be operated with facility and one that may be readily applied to its work.]

2;317.—John Shinn, of Leverington, Pa., assignor to himself and Wm. Adamson, of Germantown, Pa., for an Improvement in Clutch Pulleys:

I claim the combination of a groove pulley constructed in sections with a central loose pulley or central support loose on the shaft when the shaft is stopped, as specified, and for the described purposes.

2,318.—Hiram Woodbury (assignor to G. A. Prince and Thomas Stephenson), of Buffalo, N. Y., for an Improvement in Swells for Musical Instruments:

I claim forming the valve of the air chambers constituting the swell so that a projection of it may shut by the valve seat on the front strip of the air chamber, substantially as shown by these papers, for the purpose of qualifying and graduating the tone of reed musical instruments.

2,319.—Gilbert Van Camp (assignor to himself and Jasper Berger), of Somerset County, N. J., for an Improvement in Pumps:

I claim, first, The combination and arrangement of the short closed cylinder, A, the solid piston, B, working from end to end of said cylinder, in connection with the cylinder caps, C and C′, substantially in the manner and for the purposes set forth.

Second, In combination therewith, I claim the cylinder cap, C, and the stuffing box, M, as and for the purposes set forth.

[This invention relates to certain improvements in horizontal double acting pumps, and consists in a novel and simple arrangement of valves and water passages by which, with a short cylinder fitted up with an ordinary piston, a powerful and continuous stream of water is obtained.]

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2,320.—Amos Leonard, of Sullivan, Ohio, for an Improvement in Boring Machines:

I claim the special arrangement of the lever, K, sliding frame, D, rack lever, M, and intermediate gear wheels, operating substantially as and for the purpose specified, by which means the auger is caused to bore the mortise and is also raised up out of the hole after being bored.

2,321.—S. W. Williams, of Centerville, N. Y., for an Improvement in Ventilators for Houses:

I claim the arrangement of the wheels, A and B, provided with ventilating openings and alternate panels of glass, the two being connected and constructed as set forth, so as to be operated by means of a weight and cord, said ventilator being used for the double purpose of giving light and ventilation, as is fully specified.

2,130.—James Curran, of Kirkwood, N. Y., for an Improvement in the Application of Brakes to the Driving Wheels of Tread Powers. Patented August 27, 1861:

I claim the apparatus, the principal parts of which are hereinbefore described, and the application thereof to the front and rear of tread powers, and the security given to the brake by the hammer strap, G, Fig. 5.

1,857.—S. M. Davis, of Lawrence, Mass., assignor to A. L. Haskell, of Chelsea, Mass., for an Improvement in Tents. Patented July 23, 1861:

I claim a folding adjustable tent, made and operating as shown and described.

DESIGN.

109.—Jacob Mersereau, of Portchester, N. Y., assignor to W. P. A. and J. Abendroth, of New York City, for a Design for a Cook's Stove.

Notes and Queries

D. O. M., of N. Y.—We do not see anything whatever in your mode of constructing balloons for military reconnoissance that suggests the slightest advantage. In the first place the government would not, we think, undertake to build one, and in the next place no prudent commanding general would dare to risk himself in such a machine, with the strong probability that he might fall into the hands of the enemy. We explained some time ago the principle upon which these balloon reconnoissances were conducted, and we regard them as the safest and most reliable.

H. J., of Ohio.—The "Lois-Weedon" system of husbandry consists principally in planting seeds in rows very widely separated from one another, and cultivating between the rows in a very thorough manner. It derives its name from the place where it was first adopted in England.

W. J. P., of Allan.—Count Rumford was an American *savant* but a Tory. He left $5,000 in trust for the encouragement of scientific discovery in his native country. The interest of this sum was to be applied every second year as a premium for the most useful and important discovery in light and heat. This premium was to be bestowed in a gold and silver medal, called the "Rumford Medal," and the American Academy of Arts and Science was appointed trustee of the Count's will in 1796. We do not know what has been done with the interest of the donation. At seven per cent per annum the sum, at simple interest, should now amount to $45,500.

H. W. W., of Mass.—A very cheap and good black varnish or iron work, such as railings exposed to the weather, may be made with 2 pounds each of asphaltum and coal tar boiled for about five hours with 8 gallons of linseed oil, and 10 pounds of litharge. It should be thinned down with coal oil and turpentine to use it with a brush.

N. L. M., of Mo.—The smelting of lead ore is a very simple operation. The furnace used for the purpose contains a hollow space on the floor, into which the pure metal runs when the heat is raised sufficiently high to separate it from the slag which floats on the top. The lead is then drawn off by a plug and run into pigs. You should go and examine a lead smelting furnace before commencing operations.

C. R., of Canada.—The statement in Appleton's Encyclopedia in reference to the design patent fee to a foreigner is erroneous. No such law exists, and we are surprised that Mr. Parsons, the author, should have committed such a blunder. We may publish the whole article, with comments at some future time.

W. W., of Pa.—We attend to every part of the patent business, as you will see by reference to the pamphlet sent you. In the matter of extension the utmost care is necessary in the preparation of the case. The invention must be novel and useful. It must be shown that the patentee has not realized a sufficient reward from the patent, and it must appear that this has resulted from no cause of his own. All these points must be carefully looked into, and the position well entrenched.

B. B., of Ohio.—You are correct, Lord Macaulay died Dec. 28, 1859, and was buried in Westminster Abbey. His history of England occupied his time 12 years, and is unfinished. Who will under. take to complete it we are unable to say. No one has yet done so, and it is presumed that any living man would hesitate to assume a task so critical.

L. C., of Me.—We cannot encourage you to apply for a patent on your breech-loading rotary cannon. It contains some noveity in its details, but possesses no advantage over others. The principle defect with it is that it is too complicated, and would never answer as a field piece. A cannon ball from the enemy striking it would be apt to break some of its parts, thus disabling it.

S. C., of Conn.—Your army forge seems to be a complete and novel contrivance, much better than any other in use. You had better send us a model of it, and apply for a patent at once before selling many, as others might engage in their manufacture prior to the issue of your patent.

C. D., of Mass.—We have never heard of any accident resulting from the use of coal oil lamps. Coal oil is not explosive, but some makers are in the habit of drugging it with other ingredients so as to render it possibly unsafe. Get a good article from a reliable manufactory and it is as safe to use as a tallow candle.

E. G., of Me.—We shall soon publish a report of the patent case to which you refer in reference to the Corliss Engine. We have been searching for facts in the case and have just obtained them.

A. B., of Ky.—There is nothing new in the device you suggest for winding a watch by a permanently attached key. Watches are now sold in this market having an attachment to the watch inside the ring, by turning which the watch is wound. It cannot be applied to a common watch.

L. A., of Ill.—We are of the opinion that the cultivation of flax in this country will soon become a very important branch of industry. We understand that the demand for flax this season has been much greater than the supply. It is stated that the farmers in Canada are devoting considerable attention to this subject.

H. G. B., of Mass.—Lighting rooms by means of electricity is one of those achievements that have been shown to be perfecty practical, but are not economically so as yet. It wonld probably be better to heat a wire directly by the current, than to go through the process of decomposing water and then heating wire by burning the hydrogen. It is a fine field for experiment and invention. Write to G. W. Beardslee, 44 Cliff street, N. Y., or H. N. Baker, Birmingham, N. Y., for the price, &c., of magneto-electric machines.

A. D., of Ind.—You will find full information in relation to the mode of applying for appointment as engineer in the United States Navy, the qualifications required, &c., on page 198, Vol. IV SCIENTIFIC AMERICAN (new series).

S. H. K., of N. Y.—We have never understood that Congress made an appropriation to complete the Stevens battery, but simply appointed a committee to inquire into the expediency of so doing. You can procure gutta perch from S. C. Bishop of this city. It is not expensive.

N. C., of C. W.—Mere receipts cannot furnish you with sufficient information to enable you to distill and purify "rock oil." The management of the stills requires practical experience. Dr. Gesner's work on such oils, published by Balliere Bros., 440 Broadway, this city, will assist you materially in your business.

W. C., of N. Y.—A boiler constructed and set in the best manner should evaporate from ten to twelve pounds of water with one pound of good coal, but most boilers do not evaporate more than the half of this.

P. L. of N. Y.—To drill holes in glass, use a little turpentine to keep the point of the drill moist.

F. S. H., of Boston.—You have not sufficiently explained your mode of making wrought iron cannon to enable us to fully comprehend its importance. It appears to us to be a very good plan. You had better send us a model of it.

A. H. S., of N. Y.—The Corliss steam engines are manufactured at Providence, R. I. The best small engine for economizing fuel and water combining safety, is a hot-air.

Money Received

At the Scientific American Office on account of Patent Office business, during one week preceding Wednesday, Sept. 25, 1861:—

M. & B., of N. Y., $35; C. W. S., of Maine, $25; J. McC., of ——, $15; J. W. L., of N. J., $25; R. & T., of N. Y., $15; H. J. & T. H. B., of N. J., $30; G. W. P., of N. Y., $15; W. T. G., of Ill., $15; B. W. D., of N. Y., $10; J. M. C., of Ohio, $15; B. D. P., of Pa., $15; L. F., of Ohio, $25; H. & J., of Conn., $20; H. S. C., of N. Y., $20; O. A. A. R., of N. Y., $23; J. G., of N. Y., $25; E. K., Jr., of N. Y., $25; J. H P., of Mo., $25; S. E. & P., of Wis., $10; E. W., of N. J., $25; G. W., of N. Y., $15; J. P. L., of Mass., $20; E. E., of Cal., $40; J. W. A., of N. H., $15; S. P. C., of France, $20; W. C. K., of N. Y., $15; L. A., of Mass., $25; W. H. A., of Conn., $25; P. B., of R. I., $25; H. F., of Ohio, $20; P. P., of N. Y., $20; F. H. B., of N. Y., $25; A. S. D., of Mass., $25; J. G. S., of N. Y., $25; T. V., of Cal., $20; C. J., of Conn., $40; V. & L., of Iowa, $15; J. M. L., of Ohio, $25; J. B., of Cal., $15; J. H. H. B., of N. Y., $25; C. F. F., of N. Y., $15; J. M. M., of N. Y., $15; C. W., of Iowa, $25; S. McQ., of Ill., $30; H. J. H., of N. Y., $10; J. H. V., of Ill., $25; M. A. F., of N. Y., $30.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from Sept. 18 to Wednesday, Sept. 25, 1861:—

F. H. B., of N. Y.; W. H. A., of Conn.; C. W. S., of Maine; E. W., of N. J.; J. W. L., of N. J.; A. S. D., of Mass.; L. A., of Mass.; C. W., of Iowa; S. E. & P., of Wis.; J. McL., of Ohio; L. W. B., of Russia; J. G. S., of N. Y.; C. F. F., of N. Y.; P. B., of R. I.; W. H., of Iowa; W. T. G., of Ill.; E. K., Jr., of N. Y.; O. A. A. R., of N. Y.; M. A. F., of N. Y.

TO OUR READERS.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on Design Patents, when two good drawings are all that is required to accompany the petition, specification and oath, except the government fee.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

BACK NUMBERS AND VOLUMES OF THE SCIENTIFIC AMERICAN.—Volumes I., II. and III. (bound or unbound) may be had at this office and from all periodical dealers. Price, bound, $1.50 per volume. by mail, $2—which includes postage. Price in sheets, $1. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding.

BINDING.—We are prepared to bind volumes, in handsome covers, with illuminated sides, and to furnish covers for other binders. Price for binding, 50 cents. Price for covers, by mail, 50 cents; by express or delivered at the office, 40 cents.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO.,
No. 37 Park-row, New York

RATES OF ADVERTISING.

Thirty Cents per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement sent for publication.

INSTRUCTIONS ABOUT EUROPEAN PATENTS.

With a Synopsis of the Patent Laws of some of the Countries.

AMERICAN INVENTORS SHOULD BEAR IN MIND that, as a general rule, any invention which is valuable to the patentee in this ountry is worth equally as much in England and some other foreign countries. Four patents—American, English, French and Belgian—will secure an inventor exclusive monopoly to his discovery among 100,000,000 of the most intelligent people in the world. The facilities of business and steam communication are such that patents can be obtained abroad by our citizens almost as easily as at home. The majority of all patents taken out by Americans in foreign countries are obtained through the Scientific American Patent Agency. We have established agencies at all the principal European seats of government, and obtain patents in Great Britain, France, Belgium, Prussia, Austria, Spain, &c., with promptness and dispatch.

It is generally much better to apply for foreign patents simultaneously with the application here; or, if this cannot be conveniently done, as little time as possible should be lost after the patent is issued, as the laws in some foreign countries allow patents to any one who first makes the application, and in this way many inventors are deprived of valid patents for their own inventions.

Many valuable inventions are yearly introduced into Europe from the United State, by parties ever on the alert to pick up whatever they can lay their hands upon which may seem useful.

Models are not required in any European country, but the utmost care and experience is necessary in the preparation of each case.

GREAT BRITAIN.

Patents for inventions under the new law, as amended by the act of Oct. 1, 1852, and now in operation, include the United Kingdom of Great Britain and Ireland in one grant, which confers the exclusive right to make, use, exercise or vend. This is conceded to the inventor, or the introducer, for a period of fourteen years, subject, after the patent is granted, and the first expenses paid, to a government tax twice during its existence—once within three years, and once again within seven. The purchaser of a patent would assume the payment of these taxes.

There is no provision in the English law requiring that a patented invention shall be introduced into public use within any specified limit. Under the Patent Act of October, 1852, the British government relinquished its right to grant patents for any of its colonies, each colony being permitted to regulate its own patent system. If a patent has been previously taken out in a foreign country, the British patent will expire with it.

FRANCE.

Patents in France are granted for a term of fifteen years, unless the invention has been previously secured by patent in some other country; in such case, it must take date and expire with the previous patent. After the patent is issued, the French government requires the payment of a small tax each year so long as the patent is kept alive, and two years' time is given to put the invention patented into practice.

It should be borne in mind that, although the French law does not require that the applicant should make oath to his papers, yet if a patent should be obtained by any other person than the inventor, upon proof being adduced to this effect before the proper tribunal, the patent would be declared illegal.

BELGIUM.

Patents in Belgium are granted for twenty years, or if previously patented in another country, they expire with the date thereof. The working of the invention must take place within one year from date of patent; but an extension for an additional year may be obtained on application to the proper authorities. Inventors are only legally entitled to take out patents.

RUSSIA.

Since the close of the Crimean war, considerable attention has been given to Russian patents by Americans. Russia is a country rich in mineral and agricultural products, and there seems to be a field open for certain kinds of improvements. The present Emperor is very liberally disposed toward inventors, and as an evidence of the interest which he takes in the progress of mechanic arts, we may state that we have had visits from two distinguished Russian *savans*, specially sent out by the Emperor to examine American inventions. As Russian patents are expensive, and somewhat difficult to obtain, we do not take it upon ourselves to advise applications; inventors must judge for themselves; and this remark applies not only to Russia, but to all other foreign countries.

CANADA.

Patents of invention are granted only to actual residents of Canada and British subjects. Under the general Patent Law of Canada, an American cannot procure a patent for his invention there. The only way in which he can do so is by virtue of a special act of Parliament, which is very difficult, uncertain, and expensive to obtain. Several zealous friends of reform in Canada are working earnestly to bring about a reciprocal law, but their efforts have thus far proved fruitless.

In addition to the countries above specified, we are prepared to solicit patents in Austria, Prussia, Saxony, Hanover, Norway, Sweden, Australia, British East Indies and all other foreign countries on the most reasonable terms.

GENERAL REMARKS.

While it is true of most of the European countries herein specified, that the system of examination is not so rigid as that practiced in this country, yet it is vastly important that inventors should have their papers prepared only by the most competent solicitors, in order tha they may stand the test of a searching legal examination; as it is a common practice when a patentee finds a purchaser for his invention for the latter to cause such examination to be made before he will accept the title.

It is also very unsafe to entrust a useful invention to any other than a solicitor of known integrity and ability. Inventors should beware of speculators, whether in the guise of patent agents or patent brokers, as they cannot ordinarily be trusted with valuable inventions.

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Messrs. MUNN & CO. have been established *fifteen years* as American and Foreign Patent Attorneys and publishers of the SCIENTIFIC AMERICAN, and during this time they have been entrusted with some of the most important inventions of the age; and it is a matter of pardonable pride in them to state that not a single case can be adduced in which they have ever betrayed the important trust committed to their care. Their agents in London, Paris, and other Continental cities, are among the oldest and most reliable Patent Solicitors in Europe, and they will have no connection with any other.

CAUTION.—It has become a somewhat common practice for agents located in England to send out circulars soliciting the patronage of American inventors. We caution the latter against heeding such applications, or they may otherwise fall into the hands of irresponsible parties, and thus be defrauded of their rights. It is much safer for inventors to entrust their cases to the care of a competent, reliable agent at home.

Parties desiring to procure patents in Europe can correspond with the undersigned, and obtain all the necessary advice and information respecting the expenses of obtaining foreign patents.

All letters should be addressed to Messrs. MUNN & CO., No. 37 Park-row New York.

CHANGE IN THE PATENT LAWS.

PATENTS GRANTED FOR SEVENTEEN YEARS.

The new Patent Laws enacted by Congress on the 4th of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from **$30** down to **$15.** Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, except in reference to such countries as discriminate against citizens of the United States—thus allowing English, French, Belgian, Austrian, Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (exceptin cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of their case, inclosing the official letters, &c.

Testimonials.

The annexed letters, from the last three Commissioners of Patents, we commend to the perusal of all persons interested in obtaining Patents:—

Messrs. MUNN & Co.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill and fidelity to the interests of your employers. Yours, very truly,

CHAS. MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you have discharged your duties of Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability and uncompromising fidelity in performing your professional engagements. Very respectfully,

Your obedient servant, J. HOLT.

MESSRS. MUNN & Co.:—Gentleman: It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully,

Your obedient servant, WM. D. BISHOP.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. Over 1,500 of these examinations were made last year through this Office, and as measure of prudence and economy, we usually advise Inventors to have a preliminary examination made. Address MUNN & CO., No. 37 Park-row, New York.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row New York.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our Branch Offices.

Interferences.

We offer our services to examine witnesses in cases of interference, to prepare arguments, and appear before the Commissioner of Patents, or in the United States Court, as counsel in conducting interferences or appeals.

For further information, send for a copy of "*Hints to Inventors.*" Furnished free. Address MUNN & CO., No. 37 Park-row, New York.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention. If susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition is composed, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fee, by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co., No. 37 Park-row, New York.

The Validity of Patents.

Persons who are about purchasing Patent property, or Patentees who are about erecting extensive works for manufacturing under their Patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing Patent, before making large investments. Written opinions on the validity of Patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited For further particulars, address MUNN & CO., No. 37 Park-row, New York

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

Extension of Patents.

Valuable Patents are annually expiring which might be extended and bring fortunes to the households of many a poor Inventor or his family. We have had much experience in procuring the extension of Patents; and, as an evidence of our success in this department, we would state that, in all our immense practice, we have lost but *two* cases, and these were unsuccessful from causes entirely beyond our control.

It is important that extension cases should be managed by attorneys of the utmost skill to insure success. All documents connected with extensions require to be carefully drawn up, as any discrepancy or untruth exhibited in the papers is very liable to defeat the application.

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A New System of Engraving.

A new method of engraving has recently been patented in England by George Wallis, of London. Pulverized materials sufficiently hard to be pressed into the metallic plate to be engraved are mixed into a suitable paste, the picture is formed with this paste upon paper, vegetable parchment or other fibrous material, which is then laid upon the metal plate and passed with it between two rollers, subjecting it to a pressure sufficiently powerful to sink the hard material of the paste into the metal, thus forming the engraving.

The machine employed is illustrated in the annexed engraving, in which Fig. 1 represents it in side elevation, and Fig. 2 in vertical longitudinal section. The machine consists essentially of a pair of plain rolls mounted on horizontal axles. *a* is the upper roll, and *b* the lower roll. The bearings in which the roll, *b*, turns are fixed, while the brasses, *c c*, of the upper roll are capable of sliding in the standards, *d d*. By means of the screws, *e e*, and hand wheels, *f f*, the brasses or bearings of the upper roll, *a*, may be depressed with any desired pressure. The edges of the hand wheels, *f f*, are graduated, such divisions constituting teeth with which the fixed indices, *g g*, engage.

By this arrangement, the upper roll can be adjusted with the greatest nicety, and its parallelism with the lower roll preserved exact. Between the rolls, *a* and *b*, is a horizontal table, *h*, supported by and sliding upon steel bars, *i*. The steel bars, *i i*, are fixed to the framing of the machine at *k k*, and are elastic, having a slight play in a vertical direction. The table, *h*, may be made wholly of iron or steel, but it is preferred to make it partly of iron or steel and partly of glass, in the manner represented in Fig. 2; the part marked *h* being made of iron or steel, and the part marked *l* consisting of a slab of plate glass imbedded in the part *h*. A sheet of gutta-percha is interposed between the glass and the table. Motion is communicated to the roll, *b*, by means of a worm, *m*, and also by the worm wheel, *n*. The shaft, *o*, of the worm, *m*, turns in bearings, *p q*; the bearing, *q*, being fixed on one of the standards, *d*, and the bearing, *p*, being connected with the framing of the machine by a hanging bracket, *r*. The rotation of the worm, *m*, by means of a hand wheel, communicates a slow rotary motion to the worm wheel, *n*, and the lower roll, *b*, to the axle of which the worm wheel is affixed. The lower roll is geared to the upper roll, and thus these rolls are made to rotate simultaneously.

The action of the machine is as follows:—The plate to be impressed, and the drawing or design are laid face to face, and the table, *h*, being withdrawn from the rolls, and resting upon the slide, *i i*, the plate is placed upon the table. The table is then pushed forward into the bite of the rolls, which, by means of the hand wheel, are turned in the direction proper to carry the table forward. When the whole of the drawing or design and plate have been subjected to the pressure of the said rolls, the pressure on the upper roll is removed, and the table is pulled by its handle, *t*, from between the rolls, and the drawing and impressed plate removed therefrom. The amount of pressure which must be communicated by means of the hand wheels, *f f*, to the upper roll, *a*, depends upon the character of the design or drawing, and the nature of the metal plate to be impressed, and can only be ascertained by the experience of the workman.

The metal plates which may be most conveniently impressed by drawings, designs, prints or photographs prepared according to this invention, are plates of Britannia metal, copper and German silver; but plates of various other metals and metallic alloys may be similarly impressed.

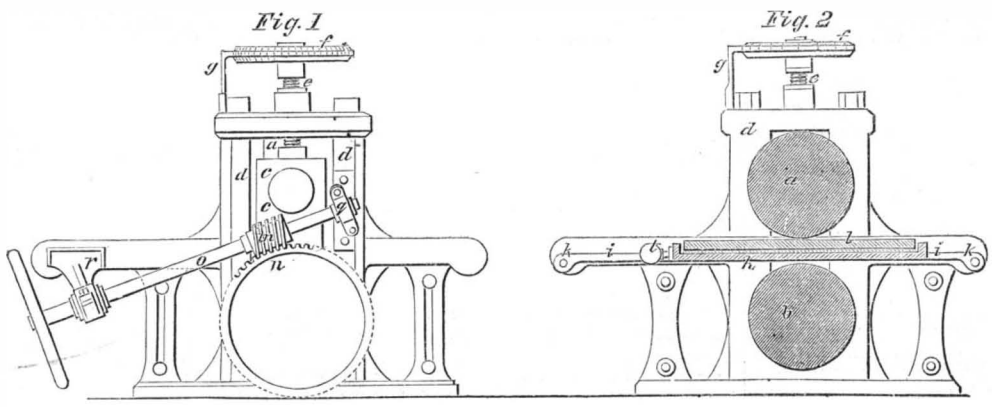
As a preparation of the plate before engraving or impressing a drawing, design or photograph upon it, as described, the said plate is usually passed several times through the machine, the surface to be impressed being placed in contact with the surface of the plane or bed of the machine. When a drawing or photograph is executed upon a slab of plate glass, the metal plate to be engraved or impressed is first passed through the machine upon the usual plane, and after the plate has been passed through the machine several times the plane is removed, and the slab on which the drawing or photograph is executed is substituted for it. The plate of metal is then passed through the machine in contact with the drawing.

The patentee gives the following formulas for preparing the paste with the mixtures of hard substances:—

Formula No. 1.—30 parts (by weight) of peroxyd of tin, 2 peroxyd of manganese, 10 Venetian red, 5 Paris white, 3 rice starch, 8 gum arabic, 2 bichromate of ammonia.

Formula No. 2.—20 parts (by weight) of peroxyd of tin, 10 peroxyd of manganese, 10 Indian red, 5 Parts white, 3 rice starch, 10 gum arabic, 2 bichromate of ammonia.

Formula No. 3.—15 parts (by weight) of finely-powdered emery, 10 Indian red, 10 peroxyd of manganese, 5 Paris white, 5 rice starch, 8 gum arabic, 2 bichromate of ammonia.



WALLIS'S NEW SYSTEM OF ENGRAVING.

When making the drawing, design or writing upon a sheet of gelatine, a sufficient quantity of the composition described in formula No. 1 is used, adding as much water as will cause it to flow freely from a pen, or brush, or hair pencil. After being allowed to stand a few minutes to dissolve the gum arabic, the whole is mixed together to about the consistency of ordinary cream. With this are drawn the outlines of the subject, and the other portions in lines and distinctly-marked touches to which it may be artistically best adapted. When dry, and after a brief exposure to daylight and the atmosphere, in order that the bichromate of ammonia may act upon the gum arabic and starch, and thus secure the drawing from ready disturbance, the touches are repeated upon such parts of the lines or markings as may not stand out in sufficient relief. For those portions of the lines or markings which it is desirable should be more strongly defined, the composition described in formula No. 2 is used; and for the parts in which it is intended the lines and markings should be darkest and strongest, the composition described in formula No. 3, mixed with water as before described, is used.

When a drawing or design is executed on paper, vegetable parchment, tracing cloth, or other suitable fibrous material, the fibrous substance is impressed in the metal plate as well as the drawing or design, and when printed in the manner of copper plate printing, the impression of the fiber gives a tint all over the drawing or design. To produce a proper effect of light and shadow, the same method is followed as that used in ordinary mezzotinto engraving. If the texture or depth of tint produced by the fiber of the paper is desired to be increased in those impressions on metal which are treated in the manner of mezzotinto engravings, the paper is coated before commencing the drawing or design with the composition, formula No. 1, mixed with water to the consistency best adapted to produce the desired effect, and after the same is dry, and properly fixed by time or the action of light, the drawing or design is made upon the surface thus produced.

The drawing or writing, executed as described, presents, when the material is dry, a surface in relief which is capable of impressing or engraving a metal surface; and such impression or engraving is capable of giving an impression, according to the artistic method of execution, either in the manner of copper plate printing, or in that of printing from wood blocks, or for the purpose of transfer to lithographic stones or zinc plates, for the purpose of printing from in the manner of lithography or zincography, or for the transfer of designs to porcelain, earthenware or Japanware. To obtain an impression which will print in the manner of copper-plate printing, that is to say, an impression in intaglio, the patentee executes the lines or touches of the drawing he desires to impress or engrave upon a suitable material, such as paper, the parts when impressed or engraved in the metal surface being capable of retaining the printing ink, and thus giving an impression. To obtain an impression which will print in the manner of a wood block, that is to say, in relievo, he paints or draws upon those portions which it is desired should not be printed from, and thus these parts being depressed in the operation of impressing upon a metal plate or surface by suitable machinery, those parts which it is desired to print from are in relief, in the manner of a wood block. Drawings, writings and designs are also prepared by making the drawing materials sufficiently glutinous by the addition of a large proportion of gum arabic; and after the drawing, writing or design has been damped, it is supplemented by the addition of a further quantity of the powdered solid, leaving out the glutinous substances and the chromic salt. In his case, when the drawing is completely finished, it is floated with the back downward upon water in a suitable vessel; and when, upon examination, the glutinous material has become sufficiently damp, it is taken from the water, and placed upon a flat board, the material which already constitutes the drawing is supplemented by dusting it with powdered glass, peroxyd of tin or emery.

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